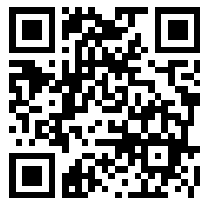

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ANCIENT CANNON IN EUROPE.

PART I.

FROM THEIR FIRST EMPLOYMENT TO A.D. 1350.

BY

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PREFACE.

ON the publication of this, the first of a series of communications on the history of Ancient Cannon in Europe, I have great pleasure in recording the obligations which I am under to John Hewitt, Esq. the author of "Ancient Armour and Weapons of Europe," compiler of the official catalogue of the Tower Armouries, &c. at whose suggestion the work was first undertaken, and to whom I am indebted for many references to MSS. and printed works bearing on the subject, for the free use of his collection of unedited drawings, and for constant valuable aid and counsel.

I wish also to thank R. R. Holmes, Esq. F.S.A. of the British Museum, and Joseph Burt, Esq. of the Public Record Office, for the kindness which they have shewn me, and the information which they have at all times readily given.

In case I should in any instance have failed to indicate by reference the sources from which I have drawn, I must here especially acknowledge the assistance derived from the works of the Emperor Napoleon III.,¹ Colonel Omodei,² Mr Hewitt,³ and Sir Harris Nicolas,⁴ and from the pamphlets of Mr Burt,⁵ and the Rev. Joseph Hunter.⁶

HENRY BRACKENBURY.

ROYAL MILITARY ACADEMY,
February, 1865.

¹ Etudes sur le passé et l'avenir de l'Artillerie.

² Dell' origine della Polvera da Guerra.

³ Ancient Armour and Weapons of Europe.

⁴ History of the Royal Navy, and other works.

⁵ On the early use of gunpowder in England, published in the *Archæological Journal*.

⁶ On the use of Gunpowder in the French Campaign of 1846-7, published in *Archæologia*.

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PART I.

FROM THEIR FIRST EMPLOYMENT TO A.D. 1350.

THE researches of antiquaries have as yet failed to bring to light any contemporary voucher, establishing the date of the first introduction of gunpowder as a propelling agent into European warfare. Many suppositions, and many confident assertions have been made as to the individual by whom, and the country in which gunpowder was invented. The Asiatic races in general, the Chinese and Arabs in particular, have been most frequently regarded as the inventors of this great power of modern war. Among Europeans, Marcus Græcus, Albertus Magnus, Berthold Schwarz, the German monk, and our own Roger Bacon, each in turn has been hailed as its discoverer.

It is not, however, in the province of this paper to discuss the merits of these various claimants, or to trace the apparently gradual manner in which the Greek fire, and the combustible compounds, thrown from the mediæval warlike engines, became developed, whether by accident or design, into that mixture of saltpetre, sulphur, and charcoal, which, from almost its earliest employment in war, bore the name in this country which it still bears, "gunpowder".

We have only to deal with the application of this mixture to purposes of warfare, in relation to the tube or instrument from which, by its agency, the missiles were thrown.

These tubes we shall find under the names of "cannon," "bombards," "tubes of thunder," &c.; and at this stage we must observe how much the difficulty of tracing their first employment is increased by the fact that, even as late as the middle of the fifteenth century, we meet with tubes, projecting balls by the action of gunpowder, called by the names of those engines,

which were employed to throw stones and darts in the sieges of days long before gunpowder was known.¹

Unquestionably before the use of gunpowder as an agent of propulsion, fiery substances were thrown in or from tubes; and tubes holding fire were attached to lance or pike heads. In time these or similar tubes were used for the projection of missiles by the force of powder, and about the date of their first employment for this purpose, they appear to have been called in the Latin of the period "canones"; a word which, spreading universally in slightly modified forms, has kept its hold to this day. This word is apparently derived from the Latin "canna," a reed or tube. In speaking of "cannon" in this paper, the word must always be understood in the sense in which we now employ it.

As to when and where these "cannon" were actually used for the first time there exists no information of value; that is to say, no contemporary document. Indeed, the authorities on which we may depend for any account of their early history are very restricted in number. There does not exist, as far as is known, the figure of a cannon in any illuminated manuscript of earlier date than the beginning of the fifteenth century; and it is almost entirely among the accounts of payments for provisions and stores of all kinds, that any mention of cannon is found at an earlier time. The loose statements of historians of a later period, and the anachronisms of the illuminators of the MSS. of the fifteenth century would lead us far astray as regards dates, were we to place confidence in their information regarding the employment of cannon in times anterior to their own. From the illuminators we should gain such information as that Gideon used field pieces on wheeled carriages with shafts, when he fought against the Midianites, as in a MS. in the British Museum.² Among the chroniclers and historians we should have difficulty in choosing a guide. Many of them make unsupported assertions; some, confusing the fiery projectiles of the ancient engines with the fire of the later cannon, date back the latter to far too early a period; while others again assign their first employment to a period at least sixty years after we have clear proof of their use. Some again confound the projectile and the cannon, and tell us quaint tales, as where Lenfant, in his history of the Hussite war, says that Ziska, the famous Hussite chief, became blind at the siege of Raby, because a "bombard" fell into his eye; while by far the greater number of those who have endeavoured to give us sound information, neglect to state the source from whence it is derived, and so to the antiquary or careful investigator their statements are worthless.

It is through such a tangled maze of misstatements and contradictions that the student of the early history of cannon has to make his way; neither rejecting, nor too credulously accepting any statement, till he has traced it back to its origin, and read it as far as possible by the light of contemporary facts and documents.

Of late years the spirit of enquiry has spread abroad. The long

¹ Thus Valturius, writing in the middle of the 15th century, calls the crossbow and the cannon alike "Balista."

² MS. Royal 18 E.V. fol. 54 b.

slumbering archives of the middle ages have been disturbed, and so searched on behalf of the disciples of science, that much valuable information has been obtained on this subject.

The researches of M. M. Reinaud and Favé, of Colonel Omodej of the late Piedmontese army, of M. Lacabane, &c., and most especially of the Emperor Napoleon III., have thrown great light upon our subject; and it is by the aid of their learned works, and those of many minor contributors, that the author has endeavoured to make his way to some understanding of this question; tracing back to its original source, wherever possible, every statement on which any doubt may be cast, or where two opinions clash; and referring to, and being guided by the original text, not trusting to translations.

In this paper, as a rule, those numerous alleged instances of the early employment of cannon, which upon careful investigation have not proved trustworthy, will, except in some case of peculiar interest, be omitted; and we will confine ourselves to the unquestionable authority of contemporary public documents, and in some instances contemporary chroniclers.

These will carry us back no farther than the year 1326, in which year dates the earliest authentic document hitherto found proving the existence of cannon.

This record, which is still in existence, gives authority to the priors, the gonfalonier, and twelve good men, to appoint persons to superintend the manufacture of cannons of brass, and iron balls, for the defence of the commune, camps, and territory of Florence.

It bears date the 11th February, 1326, and is as follows:—

“Item possint dicti domini priores artium et vexillifer justitiæ una cùm dicto officio duodecim bonorum virorum,¹ eisq̃ liceat nominare, eligere et deputare unum vel duos magistros in officiales et pro officialibus ad faciendum et fieri faciendum pro ipso communi pilas seu palloctas ferreas et canones de metallo, pro ipsis canonibus et palottis habendis et operandis per ipsos magistros et officiales et alias personas in defensione communis Florentiæ et castrorum et terrarum quæ pro ipso communi tenentur, et in damnum et prejudicium inimicorum pro illo tempore et terminio et cùm illis officio et salario eisdem per commune Florentiæ et de ipsius communis pecunia per camerarium camere dicti communis, solvendo illis temporibus et terminis et cùm eâ immunitate et eo modo et forma et eum illis pactis et conditionibus, quibus ipsis prioribus et vexillifero et dicto officio XII. bonorum virorum placuerit.”²

Now, about this time, the Genoese and English came frequently in contact on the sea, and it is possible that through the former the use of cannon might have been communicated from Italy; so that at the first glance there appears no reason why we should refuse to admit that as early as 1327,

¹ In 1321, during the wars made by Castruccio de Lucques on the Florentines, the latter, casting the blame of their ill success on the gonfalonier and priors, joined to them these twelve councillors (boni viri), as a check upon their actions.

² Vol. XXIII. (dist. II. class 2.) of the Riformagioni of Florence, p. 65. This document was first published by M. Libri in his *Histoire des Sciences Mathém. en Italie*, tom IV., p. 487, and was verified by M. de Mas-Latrie of the *École des Chartes*. It has since been more than once published.

Edward III. may have used cannon in his northern expedition against the Scotch. The statement that he did possess cannon in his camp in that expedition is made by John Barbour, archdeacon of Aberdeen, who wrote in 1375 his poem, "The Bruce, being the life and acts of the most victorious conqueror Robert Bruce, King of Scotland." Here, noticing this campaign, and speaking of that night when Douglas descended from the Scotch camp, and penetrated as far as the English boy-king's tent, he says of the Scotch:—

"Twa noweltis that day thai saw,
That forouth in Scotland had bene nane:
Tymmris for helmys war the tane,
That thaim thought than off gret bewté,
And alsua wondre for to se.
The tothyr crakys war off wer,
That thai befor herd nevir er."¹

There cannot be any doubt that Barbour by "crakys of war" meant cannon; and moreover that he distinctly intended to mark this as their first appearance in that land, for, in an earlier place in his poem, speaking of the siege of Berwick by Edward II. in 1319, and of Robert Bruce's famous defence, we find

"Jhone Crab, a Flemyng, als had he
That wes off sa gret sutelté
To ordane, and mak apparail,
For to defend, and till assaill,
Castell off wer, or than cyté,
That nane sleyar mycht fundyn be.
He gert engynys, and cranys, ma,
And purwayit gret fyr alsua;
Spryngalds, and schot, on fer maners
That to defend castells affers,
He purwayit intill full gret wane;
Bot gynnys for crakys had he nane,
For in Scotland yeit than but wene
The uss off thaim had not bene sene."²

But Barbour was only born between the years 1320 and 1326; and he can therefore be speaking only from hearsay: so that unless we can obtain some corroborative evidence, we are not justified in calling this an authentic instance of early cannon.

Such corroborative evidence, however, has never yet been produced; and there is, on the other hand, strong negative evidence that Barbour is antedating a fact of much later occurrence. All the army accounts of this period relating to this northern expedition, which are among the Queen's Remembrancer's Miscellaneous Papers at the Public Record Office have been searched either by or for the author of this paper, but no mention of guns or gunpowder or of anything of the kind is there to be found: nor does

¹ The Bruce ed. Pinkerton, 1790, Vol. III., p. 136.

² Ibid, p. 68.

there appear in other documents likely to yield such information, any notice of cannon under any name at this period.

This question has been thus carefully investigated, because almost every writer on the subject mentions this as an authentic case of the early employment of cannon.

A manuscript in the British Museum¹ called the "Kalendare of Brute" is quoted by Strutt² as an authority for the employment of cannon in 1332, but from internal evidence it appears that the MS. is of a date certainly as late as the fifteenth century, so that this again cannot be considered of any value.

In the year 1338, however, we come upon unquestionable testimony that cannon, both of iron and brass, were employed at that date on board English ships of war. We find an "indenture between John Starlyng, formerly clerk of the Ships, Galleys, Barges, Balingers, and other the King's Vessels, and Helmyng Leget, keeper of the same, 22nd June, 12 Edward III. 1338.³

The said John delivered to the said Helmyng in a ship called the "Bernard de la Tour" "ij canons de ferr sanz estuff."

The same delivered to the same the barge called "La Marie de la Tour," whereof John Brambehill is master, with the "apparaill," &c., "un canon de ferr ove ii chambres, un autre de bras ove une chambre, un ketill, un spogeour, &c. &c.

Also, "La nief appelle la carake dont Petre de Lenant est meistre," amongst other articles, "un canon."

Also, "La hulke appellee 'X'pofre de la Toure⁴ dont John Kyngeston est meistre"—among other things, "iii canons de ferr ove v chambres, un handgone, un. de ferr p^r les canons."

It must be observed here that these cannon, whether of brass or iron, appear to have been, as we shall presently find was the case at about the same period in France, breech loaders, with moveable chambers to contain the charge; each gun being provided with more than one of these chambers.

Among the parcels in the storehouse in the same day was "un petit barrell de gonpouder le quart' plein;" and there is no other mention of powder for the service of these guns.

This same year, 1338, gives us the first French document relating to cannon which has been hitherto discovered. It is in the Cabinet des Titres of the Imperial Library at Paris,⁵ and relates, according to Lacabane, to provision for the expedition to attack Southampton, which was fitted out at Leure and Harfleur in this year.⁶

¹ Harleian, No. 24.

² Manners and Customs, &c. Vol. II. p. 32.

³ Roll T. G. 11,097. This was first published by Sir Nicholas Harris Nicolas, in his *History of the Royal Navy*. London, Bentley, 1847, Vol. II. Appendix, p. 475.

⁴ Later in this same year, a ship "Christopher" was taken by the French from the English, after a fight of nine hours, when according to Grafton (p. 236, ed. prin.), guns were fired.

⁵ B. R. original parchemin parmi les titres scellés de Clairambault, Vol. XXV. fol. 1825.

⁶ This document was first published by M. Léon Lacabane, in his *Bibliothèque de l'Ecole des Chartes*, 2nd série, tom. I. p. 51.

It is as follows :—

“Sachent tous que je Guillaume du Moulin de Bouloigne, ai eu et receu de Thomas Fouques, garde du clos des galées du Roy nostre sire à Rouen, un pot de fer à traire garros à feu, quarante-huit garros ferrés et empanés en deux casesz, une livre de salpêtre et demie livre de souffre vif pour fare poudre pour traire les diz garros; desquelles choses je me tien à bien païé, et les promets à rendre au roy nostre sire ou à son commandement, toute fois que mestier sera. Donné à Leure sous mon scel, le 11^e jour de juillet l’an mil ccc trente et huit.”

This proves that there existed in the marine arsenal at Rouen in the year 1338, an iron fire-arm, which was provided with forty-eight bolts (carreaux), made of iron and feathered; also one pound of saltpetre and half a pound of sulphur to make powder to propel the said arrows: these two ingredients being unmixed.

It may also be fairly assumed that the instrument from which these projectiles were to be fired had no special name, or if it had, that such name was so uncommon as to be unknown to this William; for otherwise, in a receipt of this formal nature, that name would have been specified, and the cannon would not have been merely called an iron pot.¹

The bolts, garros or carreaux, which were the projectiles, were similar to those used for cross-bows and other engines before the invention of powder. The only known figured example of the cannon arrow, is of a date much later, in a work of the 15th century; but as the arrow there depicted so exactly corresponds with the description we have in the text above related, and with more minute details which we shall meet with further on, it may be here engraved.

Fig. 1.



British Museum, Add. MS. 24,945. fol. 94.

The word “carreau” is evidently derived from carré (square); the head of the bolt being frequently pyramidal, or square terminating in a point.

The arrows for this piece cannot have been large or heavy, as a pound of saltpetre and half a pound of sulphur was the quantity apportioned for 48 arrows. These ingredients, when mixed with charcoal, would not have made more than two pounds of gunpowder. This allows about seven-tenths of an ounce for each charge. Now supposing that the projectile was even ten times as heavy as the charge of powder, (and, with such powder, it would have thus received but a feeble impulse), the arrow would only have weighed about seven ounces.

Here we must note the fact that the ingredients of the powder were kept separately; being probably mixed when required for use.

In the same year dates a document now unfortunately not forthcoming, but which we cannot doubt was known by Ducange to exist in the Chambre

¹ Etudes sur le passé et l'avenir de l'artillerie, par L.N. Bonaparte, tom. iii. p. 72.

des Comptes at Paris. This author, whose care and correctness are unimpeachable, quotes a passage from the accounts of Bartholomew du Drach, treasurer of wars, who paid money "à Henri de Faumechon pour avoir poudres et autres choses nécessaires aux canons qui estoient devant Puy-Guillaume."¹

It is to be regretted that Ducange did not give the entire document, from which we might probably have gathered the cost and consequently approximately the size of these cannon.

About the same date, however, we find two receipts in the same chamber of accounts, one of which supplies us with the data to estimate the size of the cannon then in use: the other with the price of the materials of gunpowder. Both of these documents were published by M. Léon Lacabane, in his learned treatise on gunpowder.²

The first is a receipt for 25 livres,³ in payment for ten cannon, five of brass, and five of iron, for the defence of Cambray. It is as follows⁴:—

"Sachent tuit que nous, Hugues, sires de Cardilhac et de Bieule, chevaliers, avons eu et receu de monsr. le Galois de la Balmes, maistre des arbalestriers, pour

¹ Ducange, Glossarium. article 'Bombarda. "Illiis ab ann. 1338, in Galliâ usum fuisse docet Computum Bartholomæi du Drach Thesaurarii guerrarum istius anni: à Henri &c."'

² De la poudre à canon et de son introduction en France, par M. Léon Lacabane. Paris, 1846.

³ It is very difficult to obtain sound information as to the value of money at the period we are discussing, as so many points have to be considered before a correct estimate can be formed.

First, we must determine the actual weight of silver represented by the term 'livre' or 'pound,' and then, the weight of metal being known, its value in relation to the ordinary commodities of life must be ascertained.

French money especially was from time to time degraded by the rapacity or ignorance of the kings, who, to conceal their tampering with the coin, compelled the people to reckon at one time in crowns or écus, at another time in livres and sols, and sometimes in fractional parts of one or the other.

From the days of Charlemagne to 1108, the livre contained exactly one pound weight of pure silver, and was divided into twenty sols, and each sol into twelve deniers. The weight of the livre was first reduced by Philip I.; and its value was constantly lowered by one method or another, till, in the reigns of Charles IV. and Philip VI. (1322–1350), it did not contain more than between one-fifth and one-sixth of a pound weight of silver; and, at the Revolution in 1789, it contained less than one seventy-eighth part of a pound.

As far as weight of silver is concerned, the livre of the second quarter of the fourteenth century was equal to about 14½ francs of the present coinage.

English money, though much depreciated, never sunk to the same extent as the French; nor was it tampered with till the 28th year of Edward the First (1300). Previous to that year, the pound (tower weight, rather less than troy weight), was coined into twenty shillings, and each shilling into twelve pence or sterlings; and, till the end of the first half of the fourteenth century, the decrease in value was very small.

One pound (troy weight) of silver is now coined into sixty-six shillings, so that the shilling of the earlier part of Edward the Third's reign was worth about three and a half shillings of the present day, as far as weight of metal is concerned.

The method generally adopted to estimate the relative value of money as an article of exchange is to compare the prices of corn at different periods. By this test, which is not altogether fair, the pound or shilling in the first half of the fourteenth century was worth about fifteen times as much as the coin of the same denomination is now.—*Encyclopædia Britannica*. Article, Money.—*Le Blanc*, *Traité Historique des Monnaies de France*—*Ruding*, *Annals of the Coinage of England*.

⁴ B. R. original parchemin, parmi les titres scellés de Clairambault. Vol. 25, fol. 1826.

dis canons, chinq de fer et chinq de metal, liquel sont tout fait dou commandement doudit maistre des arbalestriers, par nostre main et par nos gens, et qui sout en la garde et en la deffense de la ville de Cambray, vingt et chinq livres deus sous et sept deniers tournois, liquel sont délivrés audit maistre et à la ville. Donné souz nostre saiel, à Cambray, le viii^e jour d'octobre mil cccxxx et noef."

Here again we come upon the iron cannon (canon de fer), and the brass cannon (cañon de metal); and we find that the ten cannon cost only 25 livres.

The other document enables us to conjecture the size of these cannon by the charge of powder which was apportioned to them. It is a receipt for eleven livres for saltpetre and sulphur for the above-named cannon. The original is as follows¹—

"Sachent touz que je Estienne Marel, escuiers, ay eu et receu de François de Lespitaul, clerc des arbalestriers du roy, nostre sire, par la main de Raoulet Haymon, lieutenant dudit François, pour salpetre et suffre vif et sec achetez pour les canons qui sont à Cambray, onze livres quatre soulz iii deniers tournois. Desquelles xi livres iiii soulz iii deniers, je me tiens à bien paiez.

"Donné à Cambray, souz mon seel le vi^e jour de décembre, l'an mil cccxxxix, laquelle poudre a esté délivrée à monsieur le maistre des arbalestriers."

Comparing these two documents with others which give authentic information of the cost of the materials for gunpowder in 1342, and of the cost of wrought-iron and brass guns in 1375, we may arrive approximately at the weight of these pieces. From these authorities we will quote more fully further on; it is sufficient for our present purpose to say, that this sum of 25 livres, in 1375, (that is 37 years later, when the cost of manufacture would have probably been less than in 1338,) would have sufficed to purchase five cannon of wrought-iron weighing about 25 lb. each, and five of brass weighing about 22 lb. each; and secondly, that the 11 livres, given for saltpetre and sulphur, would in 1342 have produced enough to make from 25 to 30 lb. of powder, or from 2½ to 3 lb. for each of these cannon; about the same amount as we estimated to have been the allowance for the "pot de fer à traire garros" already mentioned.²

Froissart, whose chronicle, although not written till some years later, is so faithful as to be looked upon as almost equal to that of an eye-witness, makes no mention of the use of cannon until the attack upon Quesnoy by the French in 1340. He says, "Mais on les fit retraire, car ceux du Quesnoy desclignèrent canons et bombardes qui jetoient grands carreaux."³

The word bombard is here used in relation to 1340, but it is not found till a later date in any contemporary account. It here doubtless signifies the small cannon throwing arrows.

We find again in this same year 1340, in the accounts of the town of Lille, where the document is still preserved, that there was paid to "Jehan

¹ B. B. &c., vol. 78, fol. 6119.

² Etudes sur le passé &c. tom iii., p. 76. Lacabane estimates that the 25 livres would have purchased 10 iron guns of about 46 lbs. weight each.

³ Liv. I. part 1, ch. cxi. ed. Buchon.

Piet de Fur pour IIII tuiau de tonnoire et pour cent garros VI livres XVI sous."¹

These tubes of thunder throwing arrows are doubtless nothing else than cannon, and from their price evidently very small ; in fact, the "pot de fer" of Rouen is repeated over again in each of these examples ; the 25 arrows for each of these cannon, and the price, are almost identical with what we have previously observed.

But, in the following year, 1341, we read in the same accounts, "A un mestre de tonnoire pour ledit tonnoire faire XI livres XII sous VIII deniers : " that is to say, as much money is here paid for one cannon as was paid at Cambrai in 1338 for four : which would allow to this piece a weight of from 100 to 120 lb., still however a very small gun, scarcely so large as a wall piece of the present day.

In an account of the bailiffs of St Omer in 1342, we find the detail of the artillery of the castle of Rihoult in Artois. This is printed entire in the Emperor Napoleon's work, vol. iii. p. 77. It was first published in the *Mémoires de la Société des Antiquaires de la Morinie*, and gives us more complete information of the cost of the material of ordnance at this early period than any other existing record.

From it we learn that two brothers, Pierre and Jehan, of Hedin, "traieurs de canon," were employed for more than two months, being paid from three to four sous a day each. We find 400 shafts of arrows "pour traire de canons" made at a cost of 5 sous per 100, and winged with brass, consisting partly of old pots cut up and melted down for the purpose ; the wings or feathers so made being nailed to the shafts, which also had leather bound round them at their extremities to prevent the wings touching the sides of, and to keep the arrow fitting closely to, the bore.

The cannon itself, though very small, was in two parts, the tube which received the arrow, and the box in which was placed the charge of powder. This box, when loaded was placed in the end of the tube, and a wedge called a "laichet" kept it in its place. The powder was ignited by an iron rod heated in a charcoal fire.

The material for the powder consisted of $2\frac{5}{8}$ lb. of saltpetre, which cost 30 sous per lb., and $2\frac{1}{2}$ lb., of sulphur, which cost a little more than 7 sous per lb. Allowing for the charcoal being added, this quantity would only give from 7 to $7\frac{1}{2}$ lb. of powder ; about $1\frac{1}{2}$ lb. of powder for 80 arrows, or less than $\frac{1}{2}$ oz. for each discharge.²

¹ These extracts were first published by M. de la Fons Méricq, in an 8vo. pamphlet. Paris, 1855.

² It may be interesting here to note the price of the articles used in comparison with the wages already mentioned.

The following articles were bought amongst others :—

An old brass pot, 20 sous.

$16\frac{1}{2}$ lbs. of brass at 2 sous, 6 deniers, per lb.

6500 nails, at 3s. 6d. per 1000.

These must have been small nails, for 400 nails for the leather cost 4s. 8d. ; $2\frac{5}{8}$ lbs. of saltpetre at 30 sous per lb. ; $2\frac{1}{2}$ lbs. of sulphur at 7s. 2d. per lb. ; a wedge 2 sous.

Frøissart mentions that at the attack on the "chatel de Sturnelin" in Scotland in this year "Les Seigneurs d' Escosse se hâterent tellement et contraignirent ceux de la dite garnison, par assauts d'engins et de canons, que par force les convint rendre aux Escots; &c."¹

He also states that when Charles de Blois was besieging Hainebon in the same year, the Countess of Montfort, who was defending the place, "faisoit apporter bombardes et pots plein de chaux vive pour jeter sur les assaillans;"² but in neither of these instances does he give us any clue to the size of these cannon.

It was probably either in this or the following year that Petrarch writes in his dialogue "De remediis utriusque fortunæ."

"I wonder that thou hast not also brazen globes, which are cast forth by the force of flame with a horrible sound of thunder. Was not the wrath of an immortal god thundering from heaven sufficient, that the small being man,—oh, cruelty joined to pride—must even thunder on earth! Human rage has endeavoured to imitate the thunder which cannot be imitated (as Virgil says,)—and that which is wont to be sent from the clouds, is now thrown from an infernal instrument of wood, which some think was invented by Archimedes when Marcellas besieged Syracuse; but he, to protect the liberty of his fellow citizens and to avert or put off the destruction of his country, devised what you are using to crush under the yoke or to exterminate a free people. This plague was only lately so rare as to be looked on as a great miracle; now, so easily taught the very worst matters are human minds, it has become as common as any other kind of weapon."³

It has been a disputed question whether the "flammis injectis" applies to the manner of propelling the brazen globes, or whether the latter were a kind of shell; but the latter interpretation, in the author's judgment, cannot be sustained.

Here we have cannon mentioned as in common use at the time of this dialogue being written. That date we will venture to call 1344; which year is also fixed upon by the Emperor Napoleon. It certainly cannot have been later, as Petrarch dedicates the treatise to Azzo da Correggio, Prince of Parma; and Azzo ceased to be Prince of Parma in 1344, when he sold his principality to Obizzo, Marquis d'Este.⁴ It may have been written earlier; at all events, Petrarch did not know the name of the inventor of these instruments only lately become so common.

The word "ligneo" is in some editions written "igneo." If the latter is correct, it merely applies to the method of propelling with flame. If

¹ Liv. I. ch. 159.

² Ibid. 173.

³ Mirum, nisi et glandes æneas, quæ flammis injectis horrisson tonitru jaciuntur. Non erat satis de cælo tonantis ira Dei immortalis, nisi homuncio (o crudelitas juncta superbis!) de terra etiam tonuisset: non imitabile fulmen (ut Maro ait) humana rabies imitata est, et quod e nubibus mitti solet, ligneo quidem, sed tartareo mittitur instrumento, quod ab Archimede inventum quidam putant, eo tempore, quo Marcellus Syracusas obsidebat; verum ille hoc, ut suorum civium libertatem tueretur, excogitavit, patriæque excidium vel averteret, vel differret; quo vos, ut liberos populos vel jugo, vel excidio prematis, utimini. Erat hæc pestis nuper rara, ut cum ingenti miraculo cerneretur; nunc, ut rerum pessimiarum dociles sunt animi, ita communis est, ut unum quodlibet genus arnorum.—De remediis utriusque fortunæ. Geneva, 1645, p. 303.

⁴ Muratori—Antiquitates Italici mediæ ævi. tom. 2, p. 614.

"ligneo," there is no evidence to support the idea that the actual cannon were wooden.

Evidently metallic balls were projected by them; and this is corroborated by other testimony; for, while as yet the only projectile which has been met with in France is the cannon arrow, or *carreau*, a document dated 29th April 1345, existing in the Imperial Library at Paris, proves the use of leaden balls in France at that epoch.

This document, printed in extenso in the Emperor Napoleons Etudes &c., Vol. iii. p. 80, is a receipt given by one "Ramundus Arqueru, artillerist to the French king at Toulouse for sundry material of war, including two iron cannon, two hundred leaden bullets, eight pounds of powder for cannon, and two hundred wedges furnished with leather for the same cannon—"duobus canonibus ferri; ii° plumbatis; viii libris pulveris pro canonibus; ii° cavillis pro eisdem canonibus munitis de tachiis."

Applying again the same test as before we find that about $\frac{3}{4}$ oz. of powder is the allowance for one charge, and estimating the projectile at ten times that weight, each leaden ball would only have weighed about 7 oz., much the same as the cannon arrows already named at an earlier period. Hence we may again conjecture that the piece from which they were fired was of the same weight, or nearly so, and not exceeding 25 lb. These cannon seem to have been loaded at the breech, and the wedge or plug covered with leather stopped the breech, and, being destroyed by the action of the powder, was renewed after each discharge.

At Cahors in the same year it appears by the accounts of the consuls of the town, that cannon were cast.¹ These accounts speak of 24 cannon, 36 lb. of saltpetre, and 25 lb. of sulphur; which would allow about 3 lb. of powder as the supply for one cannon. This shows that the cannon must have been very small.

The following year, 1346, is ever memorable in our history, for in July of that year Edward III. sailed on the expedition into France, during which, a few weeks later, was fought the famous battle of Crécy. It has been popularly considered as an established fact, that cannon were employed by the English in that action; and that it was owing to the terror caused by these new and dreadful weapons, as much as to the valour and skill of their archers, that the English gained so signal a victory on this field. This theory has however been more than once called in question; and the point has been discussed with more than usual warmth. It is a matter of some importance, for this reason: if cannon were used at Crécy, this is an instance of their employment in the field; no other instance of which is known at so early a period; the only mention made of them hitherto being at sieges, and for the defence of towns and castles.

For this reason it seems desirable to enter into the argument here, and to state the grounds of the opinions of those who hold different views in the matter. But we must bear in mind, that all our evidence as yet has gone to show, that the cannon employed at this period were of such small dimensions, and the powder was of so feeble a nature, that it is utterly impossible that three or four of such weapons, especially when we consider how

¹ Etudes &c., vol. iii. p. 80.

comparatively long must have been the time between the discharges, could have exercised any overpowering influence on the fortunes of the battle. Three or four or even more arrows or bullets from these pieces resembling blunderbusses of the present day in size would have scarcely been noticed among the hail of shafts from the bows of the archers.

Those, who uphold the opinion that cannon were used in this action, originally based their belief on the statement of Giovanni Villani, a Florentine chronicler, who details the events which took place in this century until the year 1348, when he died of a pestilence which ravaged the city of Florence. He, speaking of the battle of Crécy, says :—

“E ordino il re d’Inghilterra i suoi arcieri, che n’harea gran quantità su per le carsa, e tali di sotto, e con bombarde, che saeltavano pollottole di ferro con fuoco per impaurire e disertare i Cavalli de’ Francesci senza i colpi delle bombarde che facieno sì grande tremuoto e romore che pareva che iddio tonasse, con grande uccisione di gente e sfondamento di Cavalli.”¹

Secondly, they based their belief on a passage in the “Grandes Chroniques de Saint Denis” which runs thus :—

“Lisquieulx Anglois getterent trois canons dont il advint que les Genevois arbalestriers, qui estoient ou premier front, tournerent le dos et laisserent le traire, si ne seet ou si ce fut traison, ou non.”²

Thirdly, they based their belief on the fact that Froissart, in speaking of the attack by the English on the castle of la Roche-sur-yon in 1369, says they were accustomed to carry cannon with their armies, in these words :—

“Et encore plusieurs canons et espringalles, qu’ils avoient de pourvéance en leur ost, et pourvus de longtemps et usagés de mener.”³

Taking these three statements together, it is argued by the one party that the use of cannon at Crécy by the English is fairly proved.

There is another statement on the subject, which appears of some value, but which has been overlooked by all writers on the subject except Colonel Omodej. A history or chronicle is published by Muratori, under the name of the “Historie Pistolesi Dall’ anno m.ccc. al. m.ccc.xlviii.” In the preface Muratori speaks to this effect. “The author of this writing is unknown to us. He relates what occurred, especially in Tuscany, from 1300 to 1348. There is no room for doubt that he lived at this time, and probably the same pestilence, which carried off Villani in 1348, and to which 80,000 people fell victims, destroyed the author of this chronicle. His history is even more minute than that of Villani.”

If Muratori is right, the statement which we find in this chronicle of the employment of cannon at Crécy, is contemporary with, and strongly corroborates that of Villani. The original text runs thus :—

“Quando li Cavalieri d’Inghilterra vidono feriti grandè quantità de’ Franceschi, montarono a cavallo, e menarono con seco lo figliulo del Re d’ Inghilterra, ; e molti Galesi, li quale sono come huomini salva ichi, & altri assai con molte bombarde,

¹ Hist. di Giov. Villani, Muratori, Rerum Italicarum Scriptores, tom. xlii., col. 947, 948.

² British Museum MS. Cotton, Nero E ii. part 2, fol. 397.

³ Liv. I. ch. 585.

& assalirono lo campo del Re di Francia virilmente, facendo soccare tutte le bombarde a uno tratto: si chel li Franceschi si cominciarono a mettere in fuga."¹

To these statements, those holding the theory that cannon were not employed in the field at so early a date, and consequently were not used in the battle of Crécy, opposed that, in the numerous MSS. of Froissart, where he has related so carefully, and with such minute detail, all the events of this battle, no mention is made of any cannon or gunners; but, on the contrary, Froissart distinctly asserts that the rout of the Genevoise is to be attributed to the English archers; and they further hold, that Froissart must have known if cannon were used, as he takes his version of the action and the march preceding it from the testimony of those actually engaged therein.

A further branch of the argument is, that the portion of the *Grandes Chroniques* which contains this statement is anonymously composed, and consequently of little value. This would apply equally to the "*Istorie Pistolesi*." It is also urged that Villani, whose assertion is in fact the most difficult to oppose, was so far distant from the scene of action, that he cannot have known much about it. Besides, as Mr Hewitt says,² "both writers may be pardoned for seeking to refer the disaster that befel their countrymen to the employment of some new and terrible instrument of destruction."

To these arguments it is replied that Villani, at the time of the action, was an old man well used to courts and camps, while Froissart was only nine years old, and did not begin to write his chronicle till ten years later: and that, therefore the word of the former implies a great deal more, and is far more trustworthy, than the negative evidence afforded by Froissart's silence, which in fact, they contend, may mean nothing but that cannon were in such common use as not to require any special mention.

At this stage of the argument M. F. C. Louandre in his "*Histoire d' Abbeville et du comté de Ponthieu*,"³ published a passage from a MS. Froissart in the library at Amiens, the text of which is this:—

"Et li Angles descliquerent aucuns canons qu'il avoient en la bataille pour esbahir les Genevois."

Napoleon accepts this as a genuine voucher:⁴ but it will scarcely bear scrutiny. If it were an early MS. other transcripts would contain the same words, but this is unique. If it is, as is most probable, a late MS., the words are an interpolation, and therefore, the MS. is not a good authority.⁵

As regards the actual battle of Crécy, the author has been unable to find any further matter bearing on the question of cannon; but we have most important evidence that Edward III. was supplied with cannon shortly before he set sail for France. This, as usual, is supplied by the accounts of the period, and was first discovered, part by the Rev. Joseph Hunter,⁶ and part by Joseph Burt, Esq.,⁷ assistant keepers of the Public Records.

¹ Muratori, *Rerum Italicarum Scriptores*, tom. ii. col. 516.

² *Ancient Arms and Armour*, vol. ii. p. 297.

³ Tom I. p. 236. Paris, 1844.

⁴ *Etudes*, &c. vol. i. p. 41.

⁵ Hewitt, *Ancient Arms and Armour*, vol. 2. p. 297.

⁶ Published in *Archæologia*, vol. xxxii. p. 379.

⁷ Published in *Archæological Journal*, vol. 19, p. 68.

Now, in order thoroughly to understand the bearing of these documents upon this French campaign of 1346, we must keep in mind that on the 1st July of that year Edward III. was at Freshwater, in the Isle of Wight, waiting for a fair wind to carry him across the channel. On the 12th July he landed at La Hogue in Normandy, devastated the country for a considerable distance, and returning northwards, fought the battle of Crécy on the 26th August. He then marched on Calais, where he arrived on the 4th September, and the siege of that place lasted until late in the year 1347.

At the time in question, the Tower of London was the great repository of the king's weapons of war, which were considered as belonging to one of the king's wardrobes; and the officer in charge was called the clerk or keeper of of the king's privy wardrobe at the Tower. During the years of which we are now treating, this office was held by Thomas de Roldeston; whom we also find employed in making powder for the king's use a little time before or during the expedition.

In a book of accounts of money, paid out of the king's chamber in the time of Robert de Burton, receiver of the king's moneys in the said chamber, from 25 December, 18 E. III. 1344 to 18 October 1347, deposited among the records of the Exchequer, are sundry payments to Roldeston for things provided for the king's use by him, including cases for bows and arrows, a tent for the king's own use, &c., &c., and "*Eidem Thomæ super facturam pulveris pro ingeniis, et emendatione diversarum armaturarum—xl sol.*"

Was this "*pulver pro ingeniis*" gunpowder? Mr Hunter maintains that it was, and that the fact of the king's own tent being one of the items of this account, proves that these articles were provided before the king's departure. It is scarcely necessary to discuss either of these points, for we possess stronger and more conclusive evidence than this document affords.

John Cook, the clerk of the king's great wardrobe, (not the Tower wardrobe), renders accounts of moneys received and expended by him from 22nd December 19 Edw. III. 1345, to 31st January 23rd Edw. III. 1349; and gives the dates of the king's writs authorizing the payments. We have an entry for wax for the manufacture of the king's tent, under authority of the king's writ 4th May, 1346; and immediately following, and in connexion with this entry appears:—

"*Et eidem Thomæ de Roldeston per manus Willielmi de Stanes, ad opus ipsius Regis pro gunnis suis, ix^o xli lib. sal petreæ, et dccc lxxxvi lib. sulphur vivi, per breve Regis datum x die Maii, dicto anno xx^o: per quod Rex mandavit prefato custodi quod computaret cum prefato Willielmo de Stanes de sal petra et sulphur vivo per ipsum provisum et de precepto ipsius Regis, allocando eidem rationabile precium percellarum quas idem Willielmus per indenturam prefato Thomæ liberavit, per indenturam ipsius Thomæ receptionem ejusdem sal petreæ et sulphur vivi testificantem, sicut continetur ibidem.*"

This quantity of 912 lb. of saltpetre, and 886 lb. of sulphur for the use of the king's guns is a larger amount than we have yet met with, but it seems to us a small provision for a large army. Whatever quantity of powder it may have made, when mixed with the charcoal, seems to have been either consumed or approaching its end, when the king had been between two and three months before Calais, and a fresh supply seems to have been urgently required; for, on the 25th November, 1346, he issued a writ,

commanding all the saltpetre and sulphur that could be found to be sold to the said Roldeston. Only 750 lb. saltpetre and 810 lb. sulphur were produced by this edict.

We hear of this writ and its results in an entry of these same accounts of John Cook :—

“ Et eidem Thomæ ad opus Regis pro gunnis suis DCCL. lib. sal petræ, et CCCX lib. sulphur vivi, per breve Regis datum xxv die Novembris, per quod Rex mandavit prefato custodi quod provideri faceret ad opus Regis totum salte petre et sulphur vivi quod inveniri poterit vendendum, et illud prefato Thomæ liberari faceret per indenturam ipsius Thomæ receptionem ejusdem sal petre et sulphur vivi testificantem, sicut continetur ibidem.”

This quantity appears to have been found insufficient to complete the siege operations, for again on the 15th September 1347, the king, being still before Calais, where he had now remained for more than a year, issues a writ, and Cook again pays to William de Stanes money for saltpetre and sulphur supplied by him to Thomas de Roldeston. On this occasion 2021 lb. of saltpetre, and 466 lb. of sulphur were bought, at a very high price. We read :—

“ Et Willielmo Stanes pro MM.XXI. lib. de saltpetra et CCCC.LX.VI. lib. sulphur vivi ab eodem Willielmo ad opus Regis per Thomam de Roldeston clericum Privatæ Garderobiæ Regis emptis C.LX.VII.¹ II^s. II^d., precium cujuslibet libræ sal petræ XVIII^d., et sulphur vivi viii^d.”

Mr Hunter considers that this price of eighteenpence a pound for saltpetre, and eightpence for sulphur, was far beyond the usual price; in all probability the war had increased the value of these commodities.

Although the above accounts are for powder, and do not relate except indirectly to cannon, they shew that Edward III. must have made what in those days was extraordinary use of cannon at Calais; and, read by the light of a series of entries produced by Mr Burt, they are full of interest. This series is a *compotus* of accounts, and recites that by virtue of a writ under the Great Seal directed to the Barons of the Exchequer, 28th Jan. anno regni 27 (1353), Robert de Mildenhale, keeper of the king's wardrobe, had furnished his account of all his receipts and expenses between the 17th Oct. anno regni 18 (1344) and 29 Sept. anno regni 25 (1351). The extracts are of considerable length, and it is only necessary here to name the munitions which have reference to our own subject.

“ Et par aliud breve Regis de predicto sigillo Griffon' datum primo die Februarii, anno XIX^o, (1345) per quod Rex mandavit eidem custodi quod omnes arcus, sagittas, balistas, baudic', quarell', haucepes, armaturas, gunnis cum sagittis et pelotis, reparare, et coffras (et) dolia pro eis imponendis et trussandis providere et emere, et ea in manibus pro passagio Regis eskippare faceret, sicut &c. &c.

Again,

“ per breve Regis de sigillo predicto datum iiij die Marcii eodem anno (XX^{mo}...1346) per quod Rex mandavit eidem custodi quod omnes pavillones, arcus, sagittas, balistas, baudric' hausepes, armaturas, gunnis cum pelotis et pulvere pro eisdem gunnis &c. &c.” to be repaired and shipped &c.

Again,

“pro eisdem et aliis rebus infrascriptis ducendis usque Caleis ad Regem provisas, et eciā portagio x. gunn' cum telar', ix coffrarum cum armaturis, vj peciarum plumbi, v. barellorum pulveris, et c. magnorum pelot' plumbi pro eisdem gunn'&c. &c.

Again,

“per breve Regis de privato sigillo datum primo die Septembris predicto anno xx°. per quod Rex mandavit eidem custodi quod omnia ingenia et gunn' cum eorum apparatu in Turri Regis predicta et alia diversa,pelot', barellos, et salpetre, et pulver', et omnimodas res alia et ingenia et gunn' illis spectantes eskippari&c. &c.”

Again, “Ingenia et Instrumenta Fabrorum et Balistariorum.”

“Idem reddit compotum de ij ingeniis cum apparatu, x. gunnis cum telar' unde ij gross', v. parvis barellis cum salpetre, sulphure vivo et alio pulvere pro dictis gunnis, lxxij. pellet' plumbi grossis, xxxj. parvis pellet', vj peciis plumbi.....Et missis Regi usque Calesiam, inter alias armaturas et res Regis ibidem missas per Clementem Atte Merke valettum camere sue, ij ingeniis cum apparatu, x. gunnū cum telar', quorum ij gross', v. parvis barellis cum salpetre et sulphure vivo, lxxij pellet' plumbi grossis, xxxj. parvis pellet', et vj. peciis plumbi pro gunnis predictis, per duo brevīa Regis, quorum j. datum primo die Septembris, et aliud secundo die Septembris, anno xx°,” &c. &c.

We will sum up briefly and in chronological order the facts contained in the above extracts:—

“By the King's writ, dated

1345, 1st Feb. Guns with arrows and shot repaired and shipped for passage.

1346, 4th March. Guns with shot and powder for the same guns to be repaired and shipped.

„ 4th March. 10 guns with telar', six pieces of lead, 5 barrels of powder, 100 large leaden shot for the same guns.

„ 10th May. 912 lb. saltpetre, 886 lb. sulphur, purchased.

„ 1st Sept. All engines and guns in the tower to be shipped: shot, barrels, saltpetre and powder, and guns.

„ 1st and 2nd Sept. 10 guns with telar', two of which are large; 5 barrels with saltpetre and sulphur and other powder for the said guns; 73 large leaden shot; 31 small shot; 6 pieces of lead for the same guns, were sent to Calais.

„ 25th Nov. 750 lb. saltpetre, 310 lb. sulphur, purchased.

1347, 15th Sept. 2021 lb. saltpetre, 466 lb. sulphur, purchased.

From this we may conjecture that the orders of the 4th March and 1st February 1346, were preliminary to the equipment to the expedition to France, when 10 guns were shipped, with 10 large leaden shot and half a barrel of powder for each gun, and 6 pieces of lead to make extra shot with. Now, if these pieces of lead would each make only sixteen shot, we might have altogether 20 shot for each gun, and there were probably, as we gather from the writ of 1st February, arrows also for the guns; how small then must

these guns have been when half a barrel of powder was sufficient for so many charges. On the 10th May however, when the expedition was nearer to its complete organization, an additional quantity of powder was purchased and shipped. The king then sails, lands, and fights the battle of Crecy, and four days afterwards, when marching for Calais, he writes to order all his engines and guns, shot, barrels, saltpetre, sulphur, powder, and guns to be shipped for Calais at once, and again on the following day he writes again to the same effect. The result of this was that 10 guns, two of which are said to have been large, 5 barrels with saltpetre and sulphur and other powder for the said guns—(notice again this proportion of half a barrel of powder for each gun), 73 large leaden shot, 31 small shot, 6 pieces of lead for the same guns were sent to Calais; (again the same proportion of ten shot for each gun, and the same quantity of lead in reserve). The king has now therefore to our knowledge 20 guns at Calais, two of which appear to be of larger calibre than the others, and his ammunition seems to have lasted for three months or so; for it is not till the 25th November that he writes for more powder, and receives enough sulphur and saltpetre to make with charcoal added some 1200 or 1500 lb. of powder 60 or 70 lb. per gun; which lasted 10 months in a large siege. Clearly these guns must have been but small when 3 oz. or 4 oz. of powder per diem was sufficient for each gun.

Froissart tells us that at this siege the King of England caused to be built on the shore a strong castle of wood, to cut off the communication between the town and the sea; “*et le fit pourvoir moult bien d’espringales, de bombardes, et d’arcs à tour, et d’autres instrumens.*”¹

A manuscript in the British Museum² tells us that Edward took with him “*Ingyners lvii. artellers vi. gonners vi.*” This is in an account of household expenses, and these men were paid in war time at the rate of 6d. each per diem. We find here again evidence of the very small size of the guns, for even supposing that this is only a portion of the gunners whom he may have taken, we find them very few in number as compared with the men to work the great engines; and it is highly probable that here, as at Bioule in 1347, one man was able to work two cannons.

This is corroborated to some extent by the fact that in the later MSS., where cannon are depicted, the manipulation of each gun appears nearly always to be in the hands of one man unassisted.

There is no mention of any but leaden projectiles, if we except the arrows; neither iron nor stone shot appear to have been supplied. The ingredients of the powder, as in other instances already found, were kept separate; at all events in the greater number of the cases mentioned. The *telar* with which these guns were supplied were probably the stocks or wooden supports of the guns.³ The same word occurs in the same account clearly as the stocks of the crossbows.

In these documents and in the contemporary chronicle of Villani we have met with the words “gunnis” and “bombarde” used for the first time.

¹ Liv. I, part 1, ch. 315.

² Harleian 782, fol. 63.

³ See Mr Burt's note on this word in *Archæological Journal*, vol. 19, p. 72.

The former word "gunnis," elsewhere spelt "gonnes," and finally guns, appears to be derived from the "mangona" or "mangonel" which was one of those engines of war throwing stones, pots or barrels of flaming matter, or putrid carcasses, by means of counterweights¹, and from which on one occasion the Earl of Derby returned a messenger into the town of Auberoche in 1345.

The word "gonne" indeed seems to have been used in place of "mangonel" to denote these engines in more than one instance.²

The etymology of the term "bombard" is somewhat doubtful. It has generally been ascribed to the Greek βόμβος. Valturius, writing in the middle of the fifteenth century, says :—

"Hoc autem nomen Bombarda apud idoneos latinæ linguæ scriptores nusquam invenio, quamquam hujusmodi nominis impositio a sonitu tracta mihi nequaquam videatur absurda. Quid enim est Bombarda quam bombus sive bombizatio ardens?"³

At all events this is the first distinctive word coined to give the new weapon a suitable name. It held its ground in France and Italy for a long time; but did not apparently find favour in England, in which country only the word "gun" was adopted.

This year 1346, is fruitful in matters of interest on our subject. In September, the consuls of the town of Tournay, having heard that one Peter of Bruges was skilled in making certain engines called "connoiles" to be let off in a good town, if it should be besieged, desired him to make one, promising that if he made it well, and they approved it, he should have an order for more. Upon this Peter made one, and by desire of the consuls, proceeded to prove it, that they might learn how to use it. Peter took his cannon outside the gate "Noire aux Champs," inserted in it a quarrel (cannon arrow), which had at the end a piece of lead weighing about 2 lb., and fired it off. He laid it so that it pointed against a door and a wall. But, according to the narrator, it made such a cruel noise that the arrow passed out of the town, contrary to the expectation of Peter and the spectators, who could not tell what had become of it, and struck on the head a fuller who was near a monastery, and killed him. When Peter heard of this, he threw himself into a sanctuary. The consuls deliberated over the affair: and considering that it was entirely by their order that Peter had fired the gun, and that he was not known to have any spite against the fuller, held him blameless in the matter, and decided that it was a case of misfortune, and a sad pity.

The original document is as follows :—

"Comme li consauls de le ville euiest ordené par aneun raport que on leur en fist, que Pieres de Bruges, potiers destain, savoit faire aucuns engiens appiellés con-

¹ This early artillery is ably discussed by the Emperor Napoleon III., in his *Etudes, &c.* One or two illustrations of the mangonel are also given in a very interesting popular sketch of the history of our "Engines of War, and how we got to make them," by Captain Jervis-White-Jervis, R.A.

² Mr Burt in *Archæological Journal*, vol. 19, p. 69.

³ *De re militari* Lib. xi. There is a very good copy of this work ed. Paris 1532, in the R.A. Library at Woolwich.

noilles pour traire en une boine ville quand elle soit assisse; liquels Pieres fu mandés et li commanda lidis consauls qu'il en feist j et se il le faisoit bien et que on sen loast il en feroit pluisers. Liquels Pieres en fists j et depuis aucun doudit consel varent savoir comment on sent poroit aidier et dirent audit Pieron qu'il le voloient faire esprover. Liquels Pieres porta sen engien dehor Moriel porte as cans et mist j quariel ens auquel avoit ou beut devant une piece de plonch pesant ij lb. n environ et fist cestuy engien traire et la porta pour jeter quant j huis et j muret. Liquels engiens fist si cruel noise et si grant que li quariaus vint par dedens le ville, et ny eust personne qui la fu, ne le dit Pieron, neant que le dit quariet veust ne ne peüst pierchevoir et passa les ij murs de le ville, jusques en le plache devant le moustier S. Brisse et la atainst j homme appelle Jakemon de Raisse foulon ou kief et le jeta mort. Lyquels Pieres pour le doute de la loy de le ville se traist en saint lieu quant on li raporta le nouvelle. Sour con li consauls de le ville par grant deliberation ent avis sour che e boin consel, considérant que on avoit commandé audit Pieron a faire ledit engien et que di celui lidis consauls lavoit fait traire pour exprouver comment il se porteroit, comment il avoit pris se visée de traire cont le dit huis et muret et que hayne aucune lidis Pieres navoit audit Jak qu'on seoist et comment li quariaus sans viser sa dreta de-dans le ville; qu'il ne veoient cose aucune pour quoy li dis Pieres ne deüst estre de ceste cose purs innocens et sans coupes de le mort le dit Jak et que ce que li dis Pieres en fist fu cas de meskance et de pitey, pour quoy audict Pieron il pardonnèrent çou que par meskeance il lenestoit. Ce fu fait ou mois de septembre lan de grace mil iijc et xlvi.¹

To this the registrar appended a foot note :—"Ce canon était carré, on le chargeait d'un dez de fer. Il fut emporté par les Français au dernier siège de 1745." If the registrar speaks correctly, this was a square cannon, breech loading.

In the same year, 1346, Hugues, Seigneur of Cardailhac and Bioule, under whose direction in 1339 were constructed the ten cannon for the defence of Cambray, drew up directions for the defence of Montauban; and in 1347, for the defence of the castle of Bioule.² In the first of these documents we find among the ammunition great abundance of sulphur, of salt-petre, of camphor, and of glass, and of everything necessary to make gunpowder, or to cast fire on the "châteaux" or "chattes" of the besiegers. After the detail of other descriptions of warlike engines, such as cross-bows of different natures, &c., we come to "great abundance of stones, of cannons, and of lead;" so that apparently these cannon threw both leaden and stone shot.

In the list of warlike stores for the defence of the castle of Bioule, dated 1347, we find, following cross-bows &c., 22 cannons. These were worked by 11 men, though there were but 70 in the whole garrison, so that evidently great importance was attached to them. But the chief interest of this document lies in its proving that the cross-bows were actually superior to the cannon; for, the defenders of the large tower are directed not to embarrass each other, but, as the enemy appears, to use first the "arbalètes à tour, which carry furthest," and then the "arbalètes de deux pieds," stones, and cannons: so that throwing stones, and firing cannon are classed together.

¹ This piece has been published in many places; amongst others, in the *Etudes &c. of Emperor Napoleon*, vol. i, p. 357.

² Published at length in the *Etudes, &c.* vol. 4, Appendix 1 and 2.

The difference in point of size between the arbalète à tour and the cannon is illustrated by the fact, that, while it took two men to work one of the former, one man sufficed to serve two of the latter.

In this year (1347) in the accounts of the town of Lille we find,

“A un maistre qui vint chigieler d'un tonnoile donnet en courtoisie viii s.”

“A maistres de la ville et plusieurs ouvriers qui burent à la bienvenue dou maistre qui gietà dou tonnoile parmi le salaire d'un vallet qui ra la guerre des quarriaux xi s. vi d.”

The word here used “tonnoile” corresponds with the “connoile” made by Peter of Bruges the preceding year. The word seems to have descended from the “tuyau de tonnoire” spoken of in the accounts of this same town seven years earlier. In 1341 also, we found that a “mestre de tonnoire” was spoken of. Napoleon argues from the similitude of the latter expression with the term “maquinas de truenos” which Condé states he borrowed from the Arabs, that the Flemings learnt their use of fire-arms directly from the Arabs, for, in a charter of Brussels written in the Flemish language, the gunner is called “donderbusmeester.”¹

That cannon were not universally employed in attack or defence at this period, or else that their effects were so comparatively slight as to be unworthy of mention beside the crushing blows of the great stones thrown from the engines acting by the force of counterweights, may be inferred from the account which Froissart gives of the siege of Aiguillon in 1346, where the English were besieged by the Duke of Normandy. He tells us how the French sent to Toulouse for great engines to throw stones; and how the English made martinets which threw such large stones that they broke down all the French scaffolds; but no cannon are named on either side.²

In 1348, we find in the accounts of the town of Lille,

“Pour un canon dont on giete garos acaté iii escus val lvii s. Pour pource dont on asaia che chanon et pour ii garos et le faichon vi s. viii d.”

Again, in 1349,

“Pour un canon dont on trait garos acaté par eschevins iii escus et vi garos val iii l. xviii d.”³

These from their price must have been even smaller than the cannon bought in 1341, which weighed about 100 lbs.

In 1349, in the artillery of the town of Agen, were cannon throwing small leaden balls. An original register, containing the deliberations of the consuls, &c. of the town, runs as follows:—

“Anno domini m^occc^oxl^o nono, en Novembre fo balhada la artilharia de la vila à las personas dejus escritas....., item, an Guillem de Taliva e an Guillem de Lestroa.....e i. cano.....Item xlvj liuras de plom per far plumbadas..... Item, à M Guilhem de Cassanhas.....e i cano.....”⁴

These cannon were employed for the defence of the gates of the town in conjunction with cross-bows &c.

¹ Hence our word “blunderbuss.”

² Liv. I, part 1, chs. 258, 259, &c.

³ Etudes &c. vol. 3, p. 84.

⁴ Original Register, fol. 91 and 92. Archives de la Mairie, published in Etudes, vol. 3, p. 84.

The same cannon arrows, however, were still employed in 1350; for under date of that year we read in the accounts of the town of Lille: ¹

"A Jacquart le Fèvre, pour XL clous pour fierer les quariaux des canons as de bons, pour II caces de fier pour chacier les quariaux ens.....&c."

This "cace" was probably a description of rammer rendered necessary by the close fit of the leather on the arrow against the sides of the bore.

We have now traced these cannon from their first authentic and contemporary mention, to the end of the first half of the 14th century; and we have found them throughout but feeble weapons in comparison with the great warlike engines of the period, which still were employed for the more serious operations; the largest cannon of which we have read being not more than 120 lbs. weight.

We have found them constructed of brass, and of iron, breech-loading, the charge being placed in a chamber which was kept in its place by a wedge.

The projectiles were in some cases leaden, iron, and stone shot; in some cases arrows with an iron or leaden point, with leather bound to the shaft to keep them firmly in the tube, and winged with brass—but no one of these projectiles appears to have exceeded 2 lbs. in weight, and the greater number were far smaller. The powder was made when required for use, the saltpetre and sulphur being kept in store, and the charcoal made when wanted; the three ingredients being then mixed together by hand. This powder was of course very weak in its action, giving but low velocity to the projectile; and this fact, joined to the small size of the cannon, caused the latter to be considered of less value, for anything but close quarters, than the "arbalètes à tour."

Such cannon, however useful in a defence, where we generally find them employed, had little or no effect against the walls of cities or castles; they were quite incapable of making, or even assisting to make, a breach; and the engines already spoken of were the great weapons of assault, and also for destroying the towers, chats, and other means by which the besiegers endeavoured to gain an entrance into the besieged place.

Whether cannon were ever used in the field at this early stage is a question which it is difficult to solve. It rests almost entirely on this problem of the battle of Crécy. Napoleon has answered the question in the affirmative, but on grounds which do not appear sufficient to justify his conclusions.

It is however a matter of little moment, except to the antiquary; for the diminutive size of the cannon, the want of velocity of the projectiles, and the length of time elapsing between the discharges, must have made the cannon of little value; and we cannot for an instant doubt that these disadvantages would have more than counterbalanced any advantages they might have possessed over the longbow.

We have found them under the names of "cannon," the word being variously modified—"bombardes," "lignea instrumenta," "pots de fer," "tuyaux de tonnoire," changed before long into "tonnoilles" and "connoilles," and lastly our English word "guns," which we retain in common use to the present time.

¹ Etudes &c., vol. 3, p. 87.

In this paper the author has endeavoured to place before his readers every trustworthy piece of information which it was in his power to obtain ; and has omitted those numerous statements, which, after careful investigation, he has been unable to trace back to an authentic and reliable contemporary source. In the next paper on the subject he hopes to bring down the history of cannon to the close of the 14th century, before which epoch great changes had occurred in these weapons.

with the author's compliments

ANCIENT CANNON IN EUROPE.

PART II.

FROM A.D. 1351 TO A.D. 1400.

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FROM A.D. 1351 TO A.D. 1400.

IN a former paper¹ we traced the history of cannon as far as the close of the first half of the fourteenth century, up to which period trustworthy evidence of their employment was comparatively rare. We now enter upon a time, when, in every European nation, the great power of gunpowder began to leave its mark on the systems of warfare, and to bring about such changes, that almost every chronicler has some tale to tell of the wondrous effects of cannon.

During the first portion of the half century of which it is proposed to treat in this paper, the cannon in use throughout Europe were but little changed from those already discussed; but, towards the close of the fourteenth century, a great advance was made in the application of artillery, and we obtain evidence of cannon throwing balls heavier than those fired from any gun now in our service, and of far greater calibre than any piece which we now employ.

This great stride in the manufacture of cannon seems to have been made by most of the nations of the west of Europe at about the same time; but to mark more accurately the progress of various countries, we will deal separately with the artillery of France, England, Belgium, and Italy; selecting these nations as representing the chief actors of the fourteenth century in the great European theatre of war.²

¹ "Proceedings" R.A. Institution, Vol. IV. p. 287.

² Germany, though doubtless possessing many interesting records of the early history of cannon, must be left without notice. To search through the entire field of German historical literature in hopes of finding some stray reference which might lead to information from contemporary sources, would be a labour beyond the author's power; and the book from which he had hoped to derive assistance affords none.

Herr Moritz Meyer's *Handbuch der Technologie für Artillerie Offizieren*, which has been generally accepted in Germany as the text book for the early history of cannon, and which in its French form

And first we will speak of France, where we are provided, by the research of the Emperor Napoleon III, with a considerable series of those most valuable of all contemporary documents, bills and accounts; which enter, far more minutely than any chronicle or history, into the materials used for and the method of manufacture of the cannon of this early period, with their stores and ammunition.

The accounts of Thomas Dautresche, receiver for the town of Laon, during the years 1356-7-8, furnish interesting information, by which we can estimate the size of some cannon manufactured at Laon during these years; they give also in detail the ammunition used with them. A long extract from these accounts is published by the Emperor Napoleon,¹ from which we select the following items :—

“Jehan de Rouzis made for the city 42 cannon, 1350 iron heads for ‘garros,’ for which he received (12 May) 115 écus.²

A ‘grant canon à queue’ was bought from Colart le Chandellier for 3 écus.

600 ‘garros’ for cannon were winged with brass (empenes d’airain) for 32*s.* per 100.

Live sulphur and saltpetre to prove 43 cannon were bought from an ‘espiciier’ for 2 écus.

12 lb. saltpetre cost 3 écus, 4 lb. for 1 écu.

Blocks of oak to make ‘garrot à canons’ cost 2½ écus.

56 lb. saltpetre bought at a price of 4 lb. for 1 écu.

Wages to an ‘artilleur,’ 1 écu for three days, 12 days, 4 écus.

Technologie des armes à feu has been largely received in Europe as a standard work of reference, even by so distinguished an author as General Piobert, contains a series of assertions and assumptions unsupported by any evidence, or even by references, and in some cases carrying on their faces the stamp of improbability. It is therefore, as regards that portion which relates to the archæology of cannon, utterly worthless to the student or antiquary.

The author avails himself of this opportunity to protest against the pernicious habit of making statements, purporting to contain historical facts, without giving in every instance the source from which the statements are derived. The conscientious historian or antiquary will at once discard such books as worthless; but there will always be found a large number of bookmakers, who will accept these statements, and perpetuate them, though they may teem with error.

An instance of the necessity of tracing to its source every historical assertion, and of the consequent necessity of indicating where that source is, may here be given. Mr Sharon Turner, in his admirable *History of England during the Middle Ages*, states in a note (Vol. III. p. 490) that an account of the expenditure of the Ordnance Office in the Tower during the reign of Edw. III. shews a *maker of gun stones*, and *two gun founders*. He gives as his authority a work called Bree’s *Cursory Sketch*, which refers the statement to Harleian MS. 5166. On consulting this MS. the author at once discovered that the writing was not of the 14th century; and, on referring to the authorities of the MS. Department, the MS. was pronounced to be of the 17th century, and the details to be, not of the household of Edward III, but of that of Queen Elizabeth.

Mr Turner had omitted to test the MS. for himself, or he would doubtless have at once discovered Mr Bree’s mistake. But he gave his authority. Had he neglected this, or merely said these facts appeared from a MS. in the British Museum, it is possible that the author, trusting to the accuracy of so learned a man, might have reproduced his statement, and perpetuated a grave error in the history of cannon. This is but one instance out of scores of statements which the author has traced to their fountain head, and found to be erroneous.

¹ *Études sur le passé et l’avenir de l’artillerie*, Tom. III. pp. 88–90.

² The écu was equal to 13*s.* 4*d.*, not 14*s.* 4*d.*, as erroneously copied in the *Études*. This is evident from the fourth item of the account as it there stands.

Removal of 43 cannon (probably the 42 and the great cannon above named) beyond St Marcel for proof, and taking them back; and for the removal of 12 and returning them on a former occasion, 1 écu.

Charcoal ('charbon') for proving these cannon, 16*d*.

Timber ('mairien') and planks of white wood, on which the cannon were mounted, cost 13½ écus.

4 lb. ointment and ¼ lb. wax given to the 'artilleurs' for their work, and to grease the espringales, ½ écu.

Strong planks for the sides ('oreilles') and uprights ('montans') of the cannon, 31*s*. 5*d*.

100 'garros' winged in three places for cannon 2½ écus.

1358.

500 'garros à canons,' 5 écus.

Item, à Francois le serrurier pour IX canons sur III pies ferez et enchier denches et de platines par chacun I obole d'or valent III oboles d'or.

Item, pour XXI canons ferez et enchier chacun par lui denche et de platines et coustent les trois canons I escut valent VII escus pour tous ces canons enferer IX escus I quart.

29 lb. sulphur for powder for cannon, 5½ écus.

Charcoal, 16*s*.

Beaters to beat the powder, 20*s*.

A great leathern sack and three lesser ones to hold the powder, 12*s*.

Four dozen little leathern sacks to distribute the powder, 1 obole d'or, 2*s*.

400 'garros' winged, half for cannon, half for espringales, 2½ écus per 100, 9 écus.

Removal of the said artillery, 10*s*."

Then follow other entries relating to espringales.

From this series of accounts we learn that the corporation of Laon, already possessing at least twelve cannon, caused to be made at one time forty-three others, one of which is described as a great "canon à queue." These forty-three cannon were then removed to a suburb of the town for proof, and afterwards taken back into the town, and mounted on frames composed of timber and planks of white wood. To their form, or that of the frames on which they were placed, we have no clue; and we can only judge of their size by comparing their price with the wages of a skilled mechanic, as given in the same account, and by the quantity of powder used at their proof. Applying the first test, we find that the great "canon à queue" cost three écus (two pounds), while the *artilleur* received daily one-third of an écu; so that the value of this large cannon was only equal to nine days wages of a skilled artilleryman, or, according to another item, between twenty-two and twenty-three days wages of a common labourer.

The sulphur and saltpetre for their proof cost two écus, the charcoal 16*d*. The price of saltpetre was ½ écu per lb., and that of sulphur rather more than ½ écu per lb. If the powder contained twice or three times as much saltpetre as sulphur, (and in the previous half century the former proportion of saltpetre was rarely exceeded,) this sum of money would have sufficed for about 6 lb. saltpetre and 2½ lb. sulphur. Add to this some 2 lb. charcoal, and from 10 lb. to 11 lb. powder is obtained for the proof of forty-three cannon, or about 4 oz. of powder for each cannon. The proof charge was probably rather a large one, or else at least two discharges would be required as a safe test for each cannon; hence we deduce that 2 oz. or 3 oz. was the service charge of

powder for these guns, which, estimating the projectile at ten times the weight of the powder,¹ would not admit of any projectile heavier than about 2 lb.

Again, the whole cost of the removal of the forty-three cannon to proof, and restoring them, as well as removing twelve cannon on a former occasion, was only equal to the wages of three artillerymen for one day.

Under date of the year 1358 we find this curious item "to a blacksmith *pour IX canons sur III pies ferez et enchier denches et de platines par chascun I obole d'or valent III oboles d'or,*" and next in order "*pour XXI, canons ferez et enchier chascun par lui denche et de platines, et coustent les trois canons I escut valent VII escus pour tous ces canons enferer.*" These items are difficult of explanation. Napoleon says² "on voit dans ces comptes 24 canons placés sur trépieds et attachés par des ferrures." By this he appears to mean that the cannon were placed on tripods; but the more accurate translation of the first item seems to be, "for nine cannon on three beds," i.e. three on one stand or bed. This is the only way by which the entry "*par chascun I obole d'or, valent III oboles d'or,*" can be explained. In thus translating *pied* as the stand or bed of the cannon, we are supported by several instances of that application of the word occurring in Christine de Pisan, one of which is quoted in the second volume of the *Etudes*,³ and by the occurrence of the word, evidently bearing this meaning, in the account of the great cannon made at Caen in 1375.

The "*enches*⁴ et *platines*⁵" most probably signify vents and vent covers: and the drilling the former, and making and attaching the latter, would be legitimate work for a smith.

The extremely high price of powder is well exemplified by these accounts, ten pounds of it costing more than a great cannon. It was kept in large leathern sacks, and transferred to smaller ones for distribution. Its manufacture evidently included the process of beating, by which means the ingredients were doubtless reduced to a state of fine powder.

The projectiles used were "*garros*" or cannon-arrows, and appear to have been of different prices, and to have served for *espringales* if necessary. Their shafts were of oak; they were headed with iron, and winged with brass, the most expensive arrows being winged upon three sides.

Unfortunately we have here no means of judging from these details of the form of the supports or beds of these cannon; but in a future part of this work, where it is proposed to engrave several forms of supports from MSS. of the 15th century, this question will be again discussed.

These accounts of Laon confirm the inferences drawn from the documents cited in dealing with the history of cannon in the first half of the fourteenth century, and strengthen the opinion given that the two large guns mentioned in the accounts of Edward III. of England, in 1346, were but small pieces,

¹ This proportion was chosen in a former case, vide "Proceedings" R.A.I., Vol. IV. p. 292.

² *Etudes*, &c., Vol. III. p. 88.

³ *Ibid.* pp. 64 and 69.

⁴ *Enche*—a canal, gutter, channel. Vide Roquefort, *Glossaire de la langue Romane*.

⁵ Of the application of the "*plataine*" to the vent of the cannon, a curious instance occurs later, vide p. 81.

and hence, by deduction, that the guns not mentioned as being large must have been very diminutive. Further corroboration of this argument will be found further on.

Under date of 24th February, 1357, we read in the archives of the town of Chartres,¹

"A Guillaume le Fevre du Cloistre pour le reste qui lui estoit deu des canons que il a livrez à la ville et pour faire ferrure d'espingalles artillerie et martinez 12*l.* 10*s.*"

The town of Chartres, thus paying for cannon and other warlike engines, was no loser by its purchase; for Froissart tells us² how, eight years later, the bourgeoisie of Chartres lent their engines to the Duke of Burgundy, by which means he took the castle of Camerolles, and gave it to them "pour le salaire de leurs engins," and because they asked especially for it, as its owners had always been dangerous and troublesome neighbours.

In 1358, the famous Stephen Marcel caused his adherents to remove some cannon which were in the Louvre at Paris to the Hotel de Ville, and elsewhere. These cannon were crown property, as we learn from the fact that Jehan de Lyon, the officer entrusted with the charge of them, fled to Metz to the Dauphin, from whom he obtained a release for himself and his heirs.³

On the 17th June, 1359, a receipt was given by the "général lieutenant de monsieur le maistre des arballestriers du roy," for "deux grans canons garniz de poudre et de charbon et de plommées" for the defence of Melun⁴; and on the following 15th October, the "artilleur du roy, en son chastel de Meleun" gives a receipt for "cinquante six plommées rondes pour canons; *item* trente deux autres plommées; douze livres de plon pesant, et vint et trois livres de poudre pour canons."⁵

The archives of Lille⁶ contain an entry of payment to a messenger in the following year (1360), who was despatched to Bruges to buy "quariaux salpêtre et souffre pour la ville;" and it appears that he there purchased 5100 arrows, 30 lb. saltpetre, and 12 lb. of sulphur.

Again in 1368⁷ the citizens of Lille purchased at Tournay 23 cannon, for 23*l.* 6*s.* These were fixed by iron fastenings into wooden beds. At the same time there were purchased "cxii plommées de canon pesans cxxvii liv. et demie."

In all these instances we have only to compare the quantity of powder with the number of projectiles, or, as in the last case, to notice the weight of the projectiles themselves; and we cannot fail to be convinced that the

¹ Etudes, &c., Vol. III. p. 91.

² Froissart, ed. Buchon, Vol. I. Part 2, ch. 278, p. 486.

³ Etudes, &c., Vol. III. p. 91.

⁴ B. R. original parchemin, parmi les titres scellés de Clairambault, Vol. IX. fol. 483.

⁵ B. R. orig. parch. au cabinet des titres de la bibliothèque royale.

⁶ Etudes, &c., Vol. III. p. 93. At this time Lille belonged to France, and was not reconveyed to the Belgian provinces till 1383, when Philip the Hardy, by virtue of his marriage with Margaret, heiress of Louis of Nevers, became Count of Flanders, and received Lille as a gift from his brother, Charles V.

⁷ Ibid. p. 94.

cannon for which all these stores were provided, were still but small pieces, even when designated as great cannon.

A somewhat larger proportion of powder appears to have been allotted to four "great cannon," which were intended to form part of the armament of Harfleur in 1368.

According to Ducange¹ there appears "in computo auxiliorum coactorum pro liberatione Joannis Regis Franc. ann. 1368, in camera computor. Paris, 'Guillaume l'Escuier maistre des canons du roy, que icelui seigneur lui a ordonné estre baille pour querir cent livres d'estoffe à faire poudre pour quatre grans canons qu'il doit faire pour mettre en la garnison de Harefleur.'" But this quantity of 25 lb. powder for each cannon leaves but a small portion for each discharge, if we remember that it was intended as garrison ammunition, and so might at any time be required to last throughout a siege; and the duration of the sieges of those days frequently extended to several months.²

An extract from the register of accounts of the town of Arras furnishes the details of the stores provided for the defence of the various gates of the town in 1369. These gates appear to have been armed with several cannon, each of which was supplied with twelve "garros" and 2½ lb. of powder, about 3½ oz. for each charge. A hammer, a pair of bellows and a rammer, called "cache" or "poussoir" were the stores provided for the cannon. There were two cannon noted as small; but as 3 lb. of powder, and only 12 arrows were supplied for the two, the charge allowed for them appears to have been rather larger than that for the cannon not distinguished as small. This rather long document is printed entire in the *Etudes*;³ one extract from it will be sufficient here, all the items being almost exactly alike, the names of the "conestables" and the gates being of course changed.

"Item à Willaume de Nauve conestable, pour ledite porte de Ronville : 1 canon, XII garros, 1 martel, 1 soufflet, 1 poussoir, 1 bannière en austée, 1c de quarrelz à 1 pied, IIII pignonchiaux, 1 falot, II livres et demie de pourre et un quarteron de tourtiaulx."

An order from Louis, duke of Anjou, to the treasurer of wars, dated 15th July, 1370, for the payment of money to "Jehan Beneger, maistre de l'artillerie du roy," specifies the following military stores amongst others as those to be bought with this money: "quatre canons du pris de doze franx; IIIc cavilhes, du pris de III franx; xv livres de poudre, pour les canons, du pris de v franx; IIIc plombades du pris de VIII franx; IIII buffets et IIII payrolets, pour le service des canons du pris de III franx."⁴

These cannon only cost 3 francs apiece; and 15 lb. of powder only permits of one-twentieth of a pound being used with each of the 300 leaden projectiles. They were apparently of the same type of breech loaders as those

¹ Gloss. sub voce Canones.

² As for instance, the siege of Calais by Edward III. 1347-8, which lasted more than a year, or that of Rheims by the same monarch, lasting six months, or that of Ventadour by the due de Berry, 1387, lasting a year.

³ Appendix, Vol IV. p. xiv.

⁴ B. R. Clairamb., titres scellées, Vol. 46, intitulé: Amiraux de France, de Bretagne, Généraux des galères, fol. 169.

noticed at an earlier date, requiring a new pin or wedge (cheville) after each discharge. A pair of bellows (buffet) and a charcoal pan (payrolet) were provided for each cannon to heat the firing-irons.

Cannon of small calibre, throwing arrows, are again mentioned in a receipt bearing date the 29th December, 1371, given by "Jehan de Lions, sergent d'armes du roy et maistre de ses artilleries."¹

But it is needless to multiply instances of the employment or purchase of cannon of the same nature throughout the kingdom of France, propelling arrows or leaden shot. As yet we have met with no cannon of large size, nor with any other projectile in France than the arrow or leaden bullet.²

In 1374, however, we find new projectiles employed in France, and the cannon from which they are to be thrown are considerably larger than any which have yet appeared.

On the 1st November, 1374, Jean de Vienne, admiral of France, and the king's lieutenant in Lower Normandy, engaged at monthly wages of 15 gold francs one Girart du Figac, a "canonnier," to make certain large cannon throwing stones, and to fire them as often as might be required at the siege of St Sauveur le Vicomte. For these purposes stores of iron, steel, wood charcoal, a forge and bellows were required.

The original document from which this information is obtained is here extracted from the *Etudes*.³ It is as follows :

"Jehan de Vienne, seigneur de Roulans, admiral de France et lieutenant du roy nostre sire ou pais de la basse Normandie, à nostre bien amé Nicolas le Prestel, receveur au diocèse de Constance des aides ordonnées pour le fait de la guerre, salut. Nous avons retenu et retenons par ces présentes pour servir le roy nostre seigneur en nostre compagnie es bastides de devant St Sauveur le Vicomte, Gerart de Fyugahe, canonnier, pour faire faire certains gros canons getans pierres et en faire geter toutesfoiz que besoing en sera ; et lui avons ordonné qu'il ait et preigne de gaiges, pour chascun mois, la somme de quinze frans d'or. Si vous mandons que ses diz gaiges vous lui paieiz par chascun mois qu'il sera oudit service et jusques à ce que vous en aiez lettres de nous de cassement ; et aussi vous mandons que vous lui faciez baillier et delivrer par juste et loial pris que vous paieiz des deniers du roy, fer, acier, buche, charbon, forge, soufflés et tous autres habillements dont il vous requerra qui seront nécessaires aux ouvrages des canons qu'il nous a promis à faire, en prenant de tout ce lettres de recognoissances par lesquels rapportant avec ces présentes, tout ce que paieiz aurez pour ceste cause, vous sera alloué en voz comptes sanz contredit. Donné au Pont l'Abbé sous nostre seel, le premier jour de Novembre, l'an mil ccclx et quatorze.

" Par monseigneur le lieutenant,

" Signe, LE GUES."

Girart had completed the manufacture of one cannon on the 4th May, 1375, and calls himself, in a receipt for his materials, "canonnier et

¹ B. R. orig. parch. au cabinet généalogique, série des titres originaux.

² The author desires to modify the opinion expressed in his last paper that the stones mentioned in the directions for the defence of Montauban were intended as projectiles for cannon. He now considers that there are good grounds for believing these stones were to be thrown on the besiegers heads at close quarters, as shewn in the directions for the defence of Bioule.

³ Vol. III. p. 96.

gouverneur du grant canon qui fut fait à St Lô pour le fait de St Sauveur."¹
 We have no further particulars of the size or method of manufacture of this cannon; but the archives of the empire² have preserved the most minute account of the charges for and material used in the manufacture of another great cannon weighing more than 2000 lb., constructed at Caen in the same year, and for the same siege, under the superintendence of Bernard de Montferrat, "maistre des canons."³

On the 20th March, 1375, an order was received at Caen, from Jehan le Mercier, one of the king's counsellors, for the manufacture of a "grant canon de fer," and "Bernart de Montferrat, maistre des canons" was instructed to superintend the arrangements. The 21st and two following days were spent in erecting three forges in the market place, and surrounding them with a wooden paling, to protect the smiths from interruption. On the 22nd, three master smiths, and one smith not designated as a master, but receiving the same pay, commenced to draw wages. They had eight workmen to assist them and a man to supply the forges with fuel, charcoal powdered through a sieve, and to blow the bellows. Three other smiths, with the same wages, worked on the 26th and 27th only, and were again employed with others for short terms towards the middle and end of April. They all continued at work, with the exception of Sundays, and Monday the 23rd April, which must have been a holiday, until the 3rd May inclusive, and on the 3rd April, one Jehan Nicolle, a master smith, arrived from "Sap," whence he had been brought at the public expense, because he was said to be the best workman in iron in all the country of Normandy. The entire manufacture of this cannon employed an average number of fifteen men for six weeks; and they appear to have sometimes worked at night; for there is an item "pour chandelle pour ardre par nuyt quant on forgoit."

In the manufacture of the cannon itself, 2110 lb. of wrought-iron, and 200 lb. of steel were employed. Of the wrought-iron, 650 lb. went to form the "cuve." This "cuve" (probably the inner tube or barrel of the cannon, afterwards surrounded with rings) was made entirely of "fer d'Espengne plat," which cost 6*d.* per lb.: while the remainder of the cannon was made of "fer d'auge," and "fer d'Espengne" of apparently inferior quality, as it cost less than 5*d.* per lb. We are not told for what portion of the cannon the steel was used. The "esseulx et chevilles" bolts and pins, necessary for fixing the cannon in its bed and making the bed itself, were made from 365 lb. of iron of both descriptions. The bars of the cannon were probably welded together, and then surrounded with circles of wrought-iron having rings attached to them, for we read of an anvil hired: "le louage d'une bigorne en quoy les sercles, lians et agneaux du dit canon ont esté dréchiez et mis à point."

The whole piece was bound entirely round with rope, of which nearly 90 lb. were bought for this purpose, and was covered over all with a cow-

¹ B. R. orig. parch. cabinet généalogique série des tit. orig.

² Archives de l'Empire. Régistre coté KK. 350 et intitulé au dos *Comptes de la rançon du roi Jean, diocèse de Bayeux*, Fo. 246, and Fo. 254, et seq.

³ The documents from which this description of the manufacture of cannon at Caen has been drawn, are printed entire by Napoleon in the *Etudes*, Vol. IV. Appendix, p. xviii. et seq. They occupy twenty-seven pages 4to. It is therefore impossible to reproduce them here.

hide, sewn round to keep out the rain, lest the iron should rust, or the cords decay; “*affin que il ne pleust dessus, que le fer ne rouillast ne que les cordes ne pourrissent.*” The vent, “*pertus par où l’en metta le feu ou dit canon,*” was covered with a large iron apron (*grant plataine de fer*) fastened with a bolt, in order that the rain might not enter the vent when the cannon was loaded, “*affin que il ne pleust en icellui quant il seroit chargé.*”

The bed of this cannon comprised a large piece of elm to encase the body of the cannon;—another portion for the side-pieces (*jumelles de son siège*):—a large piece of elm for the front side-pieces (*jumelles de devant*) for lowering and raising the cannon when required:—three pieces of wood for the *patrons*, &c.:—a piece of oak for the rear side-pieces (*jumelles de derrière*):—two great pieces of wood for the two lower beams (*deux solles de desouz*) to carry the cannon:—wood to make the long bands (*lons lyans*) &c.:—four pieces of wood for the *chappeaux* and *petits lyans*, &c. Forms of beds for cannon exactly corresponding to this description are to be found in the 15th century MSS.; and the present instance will be again referred to when those designs are reproduced.

After the cannon had been “*lié des sercles et mis en bois,*” it was found necessary to purchase four pulleys to direct it (*gouverner*), as it was impossible to control it by any other means. It was proved before being sent to the siege. Four stones were ordered for the proof, but as two of them accompanied the cannon to the siege, evidently only two proof rounds were fired. Each stone cost 2s. 6d.

When the cannon was quite ready (*tout prest de jeter*), it was removed with two stone shot, all its siege bed, its bands of iron, and pins and wedges of iron and wood, to the place (Saint Sauveur le Vicomte) where it was destined to play its part. It was dismounted for transport, and remounted for the siege, as we learn from an item for baskets to carry the iron and wooden bolts, &c., “*que estoient nécessaires pour le siège d’icellui.*”¹

On the 5th May, the receiver of Caen himself started to accompany this cannon, made at so much cost, to its destination of St Sauveur le Vicomte, and completed his return journey on the 10th May. He had scarcely been home a fortnight, when orders were received from the king, dated 25th May, to make certain other cannon for the same siege. In the archives of the empire² are also preserved the accounts of their manufacture, which was superintended by four master smiths, who commenced their labours on the 28th May, and ended them on the 15th June. In making three cannon, they used 1449 lb. of iron, and 25 lb. of steel, thus allowing a weight of less than 500 lb. to each of them, though in one part of the account they are designated great cannon.

At the same time twenty-four cannon were *cast*, which in one place are called “*canons de cuivre,*” though the metal purchased for their material is styled “*mitraille.*” This “*mitraille*” probably consisted of small fragments of brass or bronze; 421 lb. only were employed for 24 cannon, so that their average weight was but 17 lb. or 18 lb. This was of course

¹ The whole of this account presents features of extreme interest to the student of the archæology of cannon, and is well worth a careful perusal.

² Archives de l’Empire. Reg. K.K. 350, F^o. 273.

an expensive material, 20*d.* per lb. being paid for it, and 12*d.* per lb. to the foundry for casting and finishing the cannon.

At the same time there were purchased ready forged five small iron cannon at a price of less than 2*l.* each.

The three large cannon were encased (*encassés*) in large pieces of elm when it was required to fire them; and there are also items for helving or handling (*pour emmancher*) the 24 copper, and 5 small iron cannon, with wood. The small cannon appear to have been bound to their stocks before removal to the siege; but the bands, bolts, pins, wedges, gudgeons, &c. (*lians, chevilles, broches, tappons, goujons, &c.*), for the three large cannon were taken separately in baskets, as we have seen was the case with the large cannon made some weeks before.

Three round stones costing 1*s.* 4*d.* each, were provided for each of the three large cannon, and 100 lb. of lead to make bullets for all the small cannon.

Thirty-one pounds of powder at 10*s.* per lb. was the quantity supplied for the whole number of pieces,—

“XXXI livres de poudres de canons, pour charger tous les diz canons: c’est assavoir, III grans getans pierres, XXIII de cuivre getans plommées et v de fer semblablement getans plommées, lesquieux furent tout prest de geter, pour chascune livre x. s. valent.....pour ce, xv fr. et demi.”

The stores for their service included iron hammers,¹ shovels for holding the charcoal, bellows for blowing the fire, &c.; the same articles, in fact, which occur in every account at this time.

We have only to compare the prices of the materials here enumerated to see how the very great cost of gunpowder must have retarded the advance of the art of gunnery:

Iron cost from	5 <i>d.</i> to 6 <i>d.</i> per lb.
Gun metal „	20 <i>d.</i> „
Steel „	10 <i>d.</i> „
Lead „	10 <i>d.</i> „
Gunpowder,,	120 <i>d.</i> ² „

¹ A curious error occurs here in the Etudes. The words “*marteaux de fer*,” which clearly express iron hammers, used with cannon at every gate at Arras, and indeed found wherever cannon and their stores are enumerated, are read “*morceaux de fer*,” and the author of the Etudes argues, Vol. III. p. 99, that they were elongated projectiles. There can be no grounds for such a suggestion. Indeed the following words express clearly that the *marteaux* were employed to drive the shot home: “pour porter à la place avec les diz canons, *pour yceulx charger* se mestier estoit.”

² Considered in relation to the ordinary commodities of life, money had then more than ten times its present value. It is interesting to compare, on this basis, the prices of these materials in 1375, with their present prices four hundred and ninety years later.

	Price per lb. in 1375 multiplied by 10.	Price per lb. in 1865.
Iron	4 <i>s.</i> 2 <i>d.</i> to 5 <i>s.</i>	1 <i>d.</i> to 1½ <i>d.</i> (bar iron, average quality).
Steel	8 <i>s.</i> 4 <i>d.</i>	4½ <i>d.</i> to 9 <i>d.</i>
Gun metal	16 <i>s.</i> 8 <i>d.</i>	12 <i>d.</i>
Lead	8 <i>s.</i> 4 <i>d.</i>	2 <i>d.</i>
Gunpowder	2 <i>l.</i>	7 <i>d.</i> (Waltham Abbey).

It is remarkable that these cannon were all loaded before being removed from Caen, and in that state taken to the siege: this is shewn by more than one item of the account. First we have

"A Guillaume de Saint Vigor, pour c livres de plon, de lui achaté pour mettre en pelotes, pour charger les canons pour porter au siege, et pour yceux recharger à la place se mestier estoit....."

Again,

"A Pierre Roillart, pour sa paine et salaire d'avoir charroïé de Caen au siège et d'illecq à la place III grans canons de fer, XXIII de cuivre et v autres petits de fer, tous chargés de pierre et de plommées, le boys, les chevilles, les gougons, et toutes les choses nécessaires pour yceulx faire geter....."

Other items confirm the above, and we can thus see the necessity for the vent-cover, if the cannon had to lie for days loaded and ready to be fired.

Cannon of considerable size seem now to have become common throughout France. Froissart mentions 140 cannon used at the siege of Odruiik by the Duke of Burgundy, in 1377, which threw projectiles of 200 lb. weight:

"Et là jetoient les canons, dont il y avoit jusques à sept vingt, carreaux de deux cents pesant, qui pertuisoient les murs; ni rien ne duroit devant eux....."¹

Later in the year William de Weston was tried before the English Parliament for surrendering this castle of Odruiik or Outherwyk, as it is called. He made the following defence:—

"Plese vous savoir coment par un Lundy, heure de prime, viendront les Enemys par le dit Chastel asseger à la nombre entour ii m. et vi. c. hommes d'armes et vii c. arblasters de genevoys ovesq v. m. de la communauté de pays cientz ix grosses canons, un grant engyn, et un trebuchet outre ascun mesure que l'en avoit unges vien par devant en cettas marches."²

Thus the statement of Froissart as to there having been large cannon employed here is confirmed by excellent evidence, but the number is considerably reduced. Indeed throughout this and all other chronicles the numbers of troops &c. must be accepted with considerable caution. We see here that the cannon had not yet entirely superseded the trebuchet.

At Ardres, earlier in the same year, the French "frent dresser et appareiller leurs canons qui portoient carreaux de deux cents pesant."³

It is remarkable that the projectiles here used should be called "carreaux." It is unlikely that the form of the arrow should have been retained for projectiles of so great weight; and we prefer to suppose that Froissart uses the word in the general sense of a projectile for cannon. We have no reason for believing that iron shot had as yet been fabricated in France, and must therefore conclude that these projectiles were of stone. The fact of their piercing the walls is also of great importance, as we have here the first

¹ Froissart, Vol. I. ch. 390, p. 716.

² Rolls of Parl. 1 Rich. II. (1377, p. 10).

³ Froissart, Vol. I. ch. 389, p. 714.

indication of the breaching powers of cannon, destined ere long to bring about a great change in the existing systems of fortification. Projectiles of equal size and even of equal weight had probably been thrown from many of the large trebuchets; but not horizontally, nor indeed with such velocity as could be obtained from gunpowder, ill made though it was at this time.

But these large and heavy projectiles of 200 lb. weight were not by any means the greatest employed at this period; nor are we dependent on the statement of the chroniclers alone; for in the same year 1377, we read in a contemporary account of a cannon to throw a projectile of 450 lb. weight, made for the Duke of Burgundy, the construction of which occupied three months, or twice as long a time as that employed in the manufacture of the largest cannon at Caen. This account is to be found in a work¹ professing to be entirely compiled from contemporary MSS., and from the second part we give the following extract:—

“Les Ducs de Bourgogne avoient de l’Artillerie, et plusieurs officiers qui en avoient soin. En un compte rendu par Simon Lambert en 1377, il est dit qu’il fut fait un canon à Châlons pour Monseigneur le Duc jettant le pesant de soixante livres, que ledit canon fut enchâssé en un plot de bois. Autres canons faits audit Châlons, dont l’un pesoit 130 livres, l’autre cent livres, un autre 90. livres, & deux autres, l’un de 30. & l’autre de 20. livres. Pour autres deniers payez pour monseigneur, par lui dus pour la forge et façon d’un gros canon jettant le pesant de quatre cent cinquante livres, fait à Châlons du commandement de mon dit seigneur par Jacquet de Paris, et par huit ouvriers de forge avec luy, par l’ordonnance de Jacquet et Rolant de Maillorques, Maîtres des canoniers d’iceluy Seigneur, lequel canon fut commencé à faire le lundi apres la Fête S. Denys, 12^e jour d’octobre 1377, et fut parfait et assis le samedi après la fête de l’apparition de Notre Seigneur, 9^e jour de Janvier l’an que dessus.”

There is no reason for doubting the accuracy or good faith with which this account is rendered; and indeed there is nothing improbable in the fact itself. We have an existing cannon of only a few years later, the projectiles of which must have been of even greater weight than this. A stone round shot of 450 lb. weight would probably exceed 21 inches in diameter, and the well known bombard of Ghent has a bore of 26 inches.

Thus there seem to have been, in France at least, no slow intermediate steps between the small breech-loading and muzzle-loading cannon projecting arrows and leaden bullets of less than 2 lb. weight, and the gigantic cannon, hurling its massive stone, which must have broken and shattered any obstacle except strong masonry. Gunpowder was still, however, pounded by hand in a mortar, as we learn from accounts in the archives of Lille, dated 1381, where we read amongst other items,

“Pour l’acat d’un mortier et le pestiel de fer à faire pourre de canons.”²

In the same accounts for the following year (1382) mention is made of leaden bullets weighing together 486 lb., and immediately afterwards of cannon which by their price were evidently but small: then of great cannon

¹ Mémoires pour servir à l’histoire de France et de Bourgogne, contenant un journal de Paris &c., &c. 2^{me} partie. Mémoires pour l’histoire de Bourgogne. Etat des officiers et domestiques de Philippe, dit le Hardy, Duc de Bourgogne. Paris 1729, p. 64.

² Etudes, Vol. III, p. 103.

throwing stones, of stone shot weighing 12½ lb. each, and of small stone shot weighing 7 lb. each.¹

In these accounts first occurs in the French language the word "bombarde," which is repeated several times during these years 1381-82. In 1381, a bombarde cost 20*l.* 12*s.* 6*d.* Two hundred and sixteen "pierres de bombarde moitié grandes et l'autre petites" cost "xiii*l.* pour le cent l'une pour l'autre."

A long and very interesting extract from these archives is given in the *Etudes*, Vol. III. pp. 103-106: but few new facts are to be gathered from it. We learn, however, that the hammers so constantly supplied were used to drive in the projectiles:

"A lui pour i martiel à cachier² plommés de canon mis à le porte du moliniei, viii*l.* s."

The small cannon so much in use at this period are called by Froissart, in speaking of the passage of the Lys in 1382, "bombardes portatives." He says,

"Adonc vinrent arbalétriers et gens de pied avant; et si en y avoit aucuns qui jetoient de bombardes portatives, et qui traioient grands quarriaux empennés de fer, et les faisoient voler outre le pont jusques à la ville de Comines."³

On this occasion arrows appear to have been thrown by the cannon; and occasionally the French discharged fiery projectiles from them. Thus we read that when the French were before Bourboursch, the soldiers were anxious to take it by force in order to obtain the plunder, which would not be theirs, should the town quietly surrender; so they skirmished, and

"Les choses monteplèrent et s'enfelonnèrent tellement que les François trairent le feu en la ville par viretons, par canons, et par sougines, et tant que maisons furent éprises et enflambées, &c."⁴

Instances of this employment of cannon will however more frequently appear in speaking of the English method of warfare.

The work already quoted⁵ on p. 34 produces another account relating to the Duke of Burgundy's artillery, in which it is mentioned that in 1394, the corporation of Dijon lent him two copper cannon, and a large cannon, with twelve round stones, for his use at Montmorot. The duke seems also to have had regular officers in his pay called "maitres des canons" and "canonniers;" but their wages were considerably less than those of his valet.

It would be tedious to bring forward further instances all tending to the same conclusion, that in France until about the year 1375, the only cannon in use were small, and the only projectiles employed lead and arrows; that

¹ *Etudes*, Vol. III. p. 103.

² The word "cace" or "cache" has already occurred in the sense of a rammer. It appears that the rammer, "cace" or "poussoir," must have been placed against the shot, and struck with the hammer.

³ Froissart, Vol. II. ch. 181, p. 236.

⁴ *Ibid.* ch. 215, p. 287.

⁵ *Mémoires pour servir à l'histoire de France*, &c.

in or about this year large cannon were first forged, and huge stone projectiles employed, and that when once the stone shot had been introduced they were made of all sizes from 7 lb. to 450 lb. ; while lead, slowly superseding the more bulky cannon-arrow, was still in use for the smaller and portable guns. At the close of the century there must have been in France cannon of every calibre from less than two inches to nearly twenty-two inches ; and if the secret of granulating gunpowder had been discovered, no stone walled castle could have withstood for a day the breaching batteries which would have been brought to bear on it. Still however the costly ingredients were finely powdered by hand, and the other large engines of war still formed a large proportion of the artillery used in sieges and defences. Iron shot have not yet made their appearance in France.

The Flemings were not behind the French in the matter of artillery, and Froissart gives us many instances of the uses to which their cannon were applied. When they were besieging Audenarde in 1379, we read that the fire of their cannon was such as to cause the defenders to cover the roofs of their houses with earth.

“ Pour le trait des canons et du feu que les Flamands lançoient et traioient soigneusement en la ville pour tout ardoir, on avoit fait couvrir les maisons de terre, par quoi le feu ne s’y pût prendre.”¹

Again at Tenremonde, the assault is described as long and horrible :

“ Car ces Flamands avoient apporté, en leurs nefs, canons dont ils traioient les carreaux si grands et si forts, que qui en étoit consuivi, il n’y avoit point de remède qu’il ne fût mort. Mais à l’encontre de ces carreaux on étoit moult pavesché...”²

In the year 1382, an instance of the employment of cannon as a defence in the field is brought to our notice. They were small, and placed on wheeled carriages, protected in front by spikes projecting beyond them. When the army was arranged in order of battle these carriages, which were called “ ribaudequins,” were placed in front as a protection from the enemy’s attack.³ In the present case we read in Froissart⁴ that the men of Ghent, making war on the town of Bruges, set off towards the latter town ;

“ Et furent environ cinq mille hommes et non plus ; et chargèrent environ deux cents chars de canon et d’artillerie.....”

When they had arrived near to Bruges, “ Se fortifient ils à l’une des parts et à l’autre lez de leurs charrois ; ” and then,

“ Ils se mirent en l’ordonnance de bataille et se quatirent tous entre leurs ribaudeaux. Ces ribaudeaux sont brouettes hautes, bandées de fer, à longs picots de fer devant en la pointe, que ils seulent par usage mener et brouettes avecques eux ; et puis les arroutèrent devant leurs batailles, et là dedans s’encloient.”

¹ Froissart, Vol. II. ch. 58, p. 80.

² Ibid.

³ Of these wheeled carriages containing cannon and protected by pikes, we shall meet with other instances at a later date. See Christine de Pisan, *Livre des Faits d’Armes*, ch. 26, fol. 36. Pierre de Fenin. p. 550, *Panthéon littéraire*. Monstrelet, ch. 84, p. 206.

⁴ Froissart, Vol. II. ch. 154, p. 203.

The editor (M. Buchon) says in a note to the word "ribaudeaux,"

"Je lis dans un autre manuscrit 'Iceux ribauldequins sont trois ou quatre petits canons rangés de front sur hautes charrettes en manière de brouettes devant sur deux ou quatre roues bandées de fer, atout longs piques de fer devant en la pointe.'¹

But while the Flemings were thus employing the smaller natures of cannon, they had not neglected to take the same step forwards in the manufacture as their French neighbours. At the siege of Audenarde in the same year, by Philip van Artevelde, the besiegers, in addition to trebuchets and other large engines, made use of a

"bombarde merveilleusement grande, laquelle avoit cinquante trois pouces de bec, et jetoit carreaux merveilleusement grands et gros et pesants; et quand cette bombarde descliquoit, on l'ouoit par jour bien de cinq lieues loin, et par nuit de dix; et menoit si grand' noise au descliquer, que il sembloit que tous les diables d'enfer fussent au chemin."²

A most graphic description this of the great bombard, but antiquaries dispute as to the meaning of the "cinquante trois pouces de bec." If by the word "bec" we may understand the mouth or muzzle of the cannon, the fifty-three pouces, or sixty inches must represent the circumference and not the diameter of the circle. This would allow a calibre of nearly twenty inches, almost as great as that of the cannon made for the Duke of Burgundy in 1377, and, as already explained, no larger than other existing specimens. It has frequently been suggested that the great bombard now at Ghent, and which certainly dates from as early a period as the first half of the fifteenth century, was no other than this very cannon of which Froissart gives such a terrible description. It has a bore 2 ft. 2 in. in diameter, and is 16 ft. 4 in. long; and we can well imagine that when a shot was propelled from such an engine, with so large a charge of powder as must have been used, it may well have seemed to the bystanders as if *tous les diables d'enfer fussent au chemin*.

We know how the approach of the army of Charles VI. compelled Philip van Artevelde to raise the siege of Audenarde, and the sad end of the fatal day of Rosebecque, on the 29th November, where Philip himself and 15,000 Flemings are said to have been slain. We are told by Froissart³ that at this battle the Flemings advancing "commencèrent à traire et à jeter des bombardes et des canons gros carreaux empennés d'airain; ainsi se commença la bataille."

The effect of this discharge was to make the French army recoil "one pace and a half." But this army differed greatly from that which the Flemings had encountered at Bruges; it was composed of the flower of French chivalry,

¹ Monstrelet describes them in 1411 as having mantlets before them and carrying one or two large cannon (*veuglaires*). A design apparently made from these descriptions appears in a work by Jean Appier Hanzelet Lorrain, published at Pont à Mousson in 1630, called "*Le Livre de Pyroteehnie*." The Emperor Napoleon (Vol. I. p. 38), considers this as a reproduction of a figure from a rare and old manuscript, and copies it; but there is no interior evidence of this in Hanzelet's work, and we cannot therefore accept the figure as an authority, although Napoleon does so without hesitation.

² Froissart, Vol. II. ch. 161. p. 214.

³ Ibid. Vol. II. ch. 197, p. 250.

and commanded by Charles VI. himself; as soon as the artillery had been once fired, its part was played, and when the militia of Ghent had to encounter hand to hand the veteran chivalry of France, there could be no doubt of the result.

This battle did not, however, terminate the struggle. Aided by the English, the men of Ghent invested the town of Ypres on the 8th June, 1383. They were supplied with artillery, but of so feeble a nature, that not one single man of the besieged was wounded by it, although the siege lasted till the 8th August, and though, as we learn from the chroniclers, two cannon, which were placed before one of the gates, never ceased firing day and night, from the 15th June, each discharge being preceded by a trumpet-call. They fired 450 shots, and beat in the doors of the gate, but the siege was abandoned.¹

The Flemings and the Liégeois were in turn allies of Brabant during the wars with Guelders in the closing years of the century; and we learn from the accounts of Malines,² which town at this time (1388) belonged to Flanders, that its cannon and engines were sent to the war; and Froissart³ relates the effect of the cannon at the siege of Grave in that year.

Indeed throughout Belgium this epoch was very favourable to the rapid development of these new weapons, for the constant struggles between the people and the feudal powers led to the adoption of every project which might contribute to their chance of victory.

For the history of English cannon, during the second half of the fourteenth century, we have but scanty materials. Few documents bearing on our subject have yet been discovered, and we can with difficulty obtain information as to the size and nature of the cannon employed by the English at this time. According to Froissart, they appear to have been used, not only for throwing shot and arrows, but also (in the earlier and first meaning of the word), as tubes for propelling Greek fire and other incendiary compositions. He tells us⁴ that when the French under King John were besieging the castle of Breteuil in 1356, then in the occupation of the English troops, the French filled up the ditch of the castle, and entered a beffroy⁵ which they had made. The garrison saw this beffroy and knew the best way to assail it. They were provided with cannon to throw fire and great arrows; and they made their arrangements to assail the beffroy and to defend themselves. Before firing their cannon, however, they attacked the occupiers of the beffroy hand to hand, and great feats were performed on both sides; but when

“ils se furent plenté ébattus, ils commencèrent à traire de leurs canons, et à jeter feu sur ce beffroy, et dedans, et avec ce feu traire épaissement grands carreaux

¹ Vereecke. *Histoire militaire de la ville d'Ypres*, p. 53, et seq.

² Accounts 1387–88. Henrard, *Histoire de l'artillerie en Belgique*. Bruxelles, 1865, p. 36.

³ Froissart, Vol. III. ch. 114, p. 707.

⁴ Ibid. Vol. I. Part 2, ch. 21, p. 332.

⁵ The beffroy was a large moveable tower on wheels. For a description of the beffroy and its use in sieges, see Napoleon's *Etudes*, Vol. II. p. 16.; and for an admirable picture of one, see M. Viollet Le Duc's "*Architecture Militaire*."

et gros, qui en blessèrent et occirent grand' foison, et tellement les ensonièrent que ils ne savoient au quel entendre. Le feu, qui étoit grégeois, se prit au toit de ce beffroy, et convint ceux qui dedans étoient issir de force, autrement ils eussent été tout ars et perdus.....”

Later in the same year, the Black Prince was besieging the castle of Romorentin, when he gave orders,

“à apporter canons avant et à traire carreaux et feu grégeois dedans la basse cour : si cil feu s'y vouloit prendre, il pouroit bien tant monter qu'il se bouteroit au toit des couvertures des tours du châtel, qui pour le temps étoient convertes d'estrain :..... Adonc fut le feu apporté avant, et trait par bombardes et par canons en la basse cour, et si prit et multiplia tellement que toutes ardirent.....”¹

If the first of these cases leaves any doubt as to whether the Greek fire was cast by the cannon or by other means, the last quotation must remove it. But we must rest satisfied with the fact that fire was so thrown, as we have no information as to the manner in which the cannon were made to serve this purpose.²

The fact that the English artillery was not required for home service, but for foreign invasion, and that, as far as we can judge, the English did not make their own cannon, will account for our finding so few documents relating to guns, and none relating to their manufacture, among the English records. Mr Hunter, in a paper on the early use of gunpowder in England,³ informs us that in the 34th Edward III. (1360), there were only four guns of copper and 16½ lb. of gunpowder in the privy wardrobe, which was, as shewn in a former communication, the repository of the king's weapons of war; and one of these guns, with many arrows and bows, was taken by Lionel Earl of Ulster, when he went to Ireland. This scarcity of guns in England at that time was, however, probably caused by the demand for foreign service, which continued to drain the kingdom of military stores; for again, in an account of John de Sleaford, clerk of the wardrobe, arms, &c., 38-43, Edw. III. 1364-1369:⁴ there occurs,

“Item, found in the said private wardrobe of the king two great guns of copper,”

and no other mention of cannon.

Calais, as Mr Hunter informs us, was in those times scarcely less than the Tower a dépôt of military stores. William de Redeness was keeper of the king's stores there in 1369, and the two following years; at which time there were in his charge 15 guns, 995 lb. of saltpetre, 1298 lb. of sulphur, three great guns of brass, and one of iron, 224 balls of lead, 84 lb. of gunpowder, &c.⁵ Calais was indeed the English base of operations throughout the French campaigns of this period, and we find that the English troops

¹ Froissart, Vol. I. Part 2, ch. 26, p. 337.

² A short description of the Greek fire and its introduction into Western Europe, may be found in Major Owen's Lectures on Artillery, 4th Edition, pp. 4-8.

³ Archæologia. Vol. XXXII. p. 384.

⁴ Roll marked F. L. H. 532, published by Sir Harris Nicolas, History of the Royal Navy, Vol. II. App. p. 477.

⁵ Archæologia. Vol. XXXII. p. 384.

carried cannon about with them on their march through the country. When the troops of Sir John Chandos were besieging Montsac in 1369, they, "levèrent devant les murs aucuns canons qu'il portoient,"¹ and in the same year before La Roche-sur-Yon, they had "plusieurs canons et espringalles, qu'ils avoient de pourvéance en leur ost, et pourvus de longtems et usagés de mener."²

According to Cuvelier, a troubadour of the 14th century, bombards were used by the Black Prince at Najara in 1367, but Froissart is silent on the subject, though he especially notices the Spanish slings. Cuvelier says that the English weapons included

"Bombardes, ars à tour, espées et espois."³

It is very probable that the English did carry with them some small bombards, to be used whenever a castle was to be besieged.

The department of gunnery in the Tower appears to have become of sufficient importance in or before the year 1370 (44, Edw. III.), to have had an officer of its own under the keeper of the wardrobe. An account rendered by this officer of his receipts and expenses, from the 1st March 44th year (1370), to 31st March (48th year) 1374, is given by Mr Hunter in *Archæologia*,⁴ and as that publication is probably accessible to but few of those for whom these papers are designed, and the account presents features of great interest in connection with early English cannon, it is here re-published.

"Particule compotis Johannis de Derby de omnibus receptis expen. et custag. per ipsum fact. pro gunner. R. a primo die Martij anno xliij^o usque ultimum diem eiusdem mens. anno xlvij^o."

Rec. denar.	Idem reddet compotum de <i>xxiiij. li. xij. s. v. d.</i> recept. de Johanne de Sleaford clerico private Garderobe Reg. infra Turrim London. per divers. vic. per temp. huius comp. Summa <i>xxiiij. li. xij. s. v. d.</i>
Empt. divers rerum.	Idem computat in bagg. de coreo oll. et patell. terr. fagot. salic. talwod. et al. necessar. divers. offic. gunner. tangent. empt. et expend. super factur. pullveris et pil. plumb. pro gunner. necnon cariag. portag. et batell. plumb. barell. cum sulfur et salpetr. et al. rerum predict. de diversis locis usque Turrim London. Quenesburgh. et alibi una cum vadiis divers. operar. operanc. et laboranc. circa pulveres et pil. plumb. predict. faciend. et fundend. infra tempus huius compoti <i>cxxj. s. vj. d.</i> Et in ij. mort. eneis iij. pestell. ferr. xij. coclear. ferr. pro pil. plumb. fundend. x. form. de laton. pro eisdem pil. faciend. j. par. balanc. xxx. barell. parv. cum garnett. hasp. et stapul. pro pil. plumb. inponend et custodiend. viij. al. barell. maioribus pro pulv. xxx. cerur. parv. pendent. pro predict. xxx. barell. ccxx. lb. salpetr. ij. sars. et xvij. belowes empt. ad diversa precia infra dictum tempus <i>xiij. li. viij. s. ij. d.</i>

¹ Froissart, Vol. I. Part 2, ch. 273, p. 579.

² Ibid. ch. 284, p. 585. This usage of carrying cannon was cited as one of the arguments that cannon were employed at Crécy. See "Proceedings," R.A. Institution, Vol. IV. p. 298.

³ Chron. de Bertrand du Guesclin par Cuvelier, line 11,069. Paris 4^e, 1839.

⁴ *Archæologia*, Vol. XXXII. p. 386.

Summa xxv. li. iiij. s. viij. d. Et habet superplus. xij. s. iij. d.

Idem redde ij. mort. eneis. iij. pestell. ferr. xij. coclear. ferr. x. form de Laton. j. par balanc. xxx. barell. parv. cum apparatu viij. al. barell. maioribus xxx. cerur. parv. pendent. ccxx. lb. salpetr. ij. sars. et xvij. belowes de emptione ut supra. Et de j. cista flandr. xxix. gunn. ferr. vj. martell. ferr. xxvij. drivels ferr. xxvij. firingyrens ferr. xij. patell. ferr. x. par. forcipum ferr. pro form. predict. j. carr. vj. wag. plumb. j. pipa et ij. barell. salpetr. pond. pur. m. liiij. lb. recept. de Johanne de Sleford. Et de j. wag. et vj. clav. plumb. rec. de Willielmo de Sleford. clerico operac. R. apud Westm. Et de j. barell. de sal. geñe cc. lb. salpetr. xij. gunner. de laton. et ij. barell de sulfur. vyf. pond dlixvj. lb. rec. de Helmingo Leget. De quibus

Rec. divers rerum.

Idem computat in devastatione et casual. perditione circa operac. pulver. et pil. plumb. et diversis viag. R. infra tempus predict. v. colear. ferr. j. par. balanc. vij. barell. parv. cum apparatu viij. barell. maiora xxx. cerur. j. sars. xj. belowes ccxij. lb. salpetr. ciiij^{xx}. lb. sulfur. iij. gunner. ferr. j. gunner. de laton. ij. martell. ferr. xv. drivels ferr. xj. firingyrens iij. wag. vj. clav. plumb. Et in expens. iij^c. xx. lb. salpetr. et cvij. lb. sulfur. vyf. fact. in pulver. et expend. in predict. viag. et vj. wag. et xxj. clav. plumb. in pil. expen. in eisdem viag.

Devastatio expen et liberae, divers rerum.

Et idem computat liberasse predict. Johanni de Sleford ij. mort. enea iij. pestell. ferr. vij. coclear ferr x. form. de laton. cum x. par. forcipum ferr. xxiij. barell. parv. cum garnett. et al. apparatu ferr. j. sars. vij. belowes. j. cistam flandr. xxvj. gunner. ferr. iij. martell. ferr. xij. drivels ferr. xvij firingyrens xij. patell. ferr. j. carr. et xj. clav. plumb. in pil. fact. et ij. parvis peciis plumbi viij^c. vij. lb. salpetr. pur. iij. c. xliij. lb. sulfur. pur. cxxxv. lb. salpetr. et xlix. lb. sulfur in pulv. fact. et xj. gunner de laton. et j. barell. de sal geñe."

These accounts contain :—

- (1) A statement of a certain sum received.
- (2) An account of the expenditure of that sum.
- (3) A receipt for the materials charged for in (2).
- (4) „ „ other materials received.
- (5) An account of expenditure by wear and tear, loss, and manufacture.
- (6) Delivery-voucher of the balance of material to the keeper of the wardrobe.

The ordnance and stores which find a place here are,—

Guns, 29 iron, 12 brass.

Materials for powder, in sacks and barrels, 1474 lb. saltpetre, 566 lb. sulphur, willow faggots for charcoal.

For manufacture of powder, a pair of scales to weigh the ingredients; two brass mortars, and three iron pestles to grind them with.

For storage and portorage of powder, eight large barrels.

Materials for shot, lead, 1 carr., 7 wag., 6 clav.

For manufacture of shot, twelve iron ladles in which to melt the lead, ten brass moulds for the bullets, and ten pairs of iron pincers for removing the shot from the moulds. Brushwood for the fire, and bellows.

For storage and portorage of shot, thirty small barrels with "garnett," hasps, staples, and hanging locks.

For the service of the guns,—For loading, twenty-eight iron *drivels*,¹ six iron hammers. For firing, 13 iron pans to hold lighted charcoal, bellows to blow it, and twenty-eight firing irons, to be heated in the charcoal pans, and then used to fire the powder.

The size of the guns is not determined by these accounts. There are sufficient materials to make about 2600 lb. of powder, or about 65 lb. for each gun. Where the guns were made, or how, we have no information; twenty-nine were of wrought-iron, twelve of brass. The powder was pounded in a mortar, and the proportions were exactly three parts of saltpetre (320 lb.) to one of sulphur (107 lb.): the quantity of charcoal is not named. The leaden bullets were cast in brass moulds.²

John de Sleford, though he had so careful an assistant in John Derby, does not appear to have handed over into his charge all the guns and their stores at the Tower; for his own accounts for the same period have many interesting items connected with gunnery, and he acknowledges at the end of his accounts the receipt of the gunpowder and materials which John Derby names in his delivery-voucher. These accounts are given by Sir Harris Nicolas,³ and neither he nor Mr Hunter seem to have been aware how the researches of each corroborated those of the other. They are as follows:—

Particulars of the account of John de Sleford, clerk of the privy wardrobe, of armour, shot, gunpowder, &c., 46–48, Edw. III., 1372–1374.

ROLL T. G. 674.

Payments for "helvyng" of eight guns and ten hatchets "ad modum pycoys," by agreement made in gross with a certain "joignour," 13s.; and &c. &c.

And for wages of several workmen each at 6d. per diem, for various terms, in the making of powder and "pelottes" of lead for "gunnes" at the Tower of London, 33s.; and for one quarter of coal, price 10s.; and for talwood, bought for casting (*fundendo*) the lead and drying the powder, 5s. 2d.; and for willow fagots to make powder, price of the hundred 4s.

And for four "trays" of wood, price 3d.; and for brazen pots and dishes, price in the whole 13d., bought for the drying of the same powder over the fire and by the sun, 2s. 1d.; and for leather bags to hold the same powder, 10s. 7d.; and

¹ This word seems to correspond with the word "drift" which we now use in the service of artillery. They both appear to be derived from the verb to "drive," and to signify the piece of wood or iron placed between the mallet and the object which it is intended to drive in. The leaden shot seems to have been placed in the bore, and the drift or drivel held against it, and struck with the hammer. See the similar use of the *cace* or *poussoir*, foot note, p. 35, *ante*.

² The same Helmyng Leget who was keeper of the king's barges in 1338, again appears in these accounts. See Vol. IV. p. 291.

³ History of the Royal Navy, Vol. II. Appendix, p. 479.

for two brass mortars, three iron pestles, twelve iron spoons, to make leaden bullets (*pi' plumb'*), ten moulds of "laton" to make the same; one pair of scales to weigh the powder; thirty small barrels with "garnett," hasps, and staples to hold and keep the leaden bullets (*pi' plumb'*); thirty small hanging locks (*serrur' paro' pend'*) for the aforesaid thirty barrels; 220 lb. of saltpetre, two "sarces," eighteen "belowes," twenty-four leather bags to "deliver" the powder; earthen pots and pans to dry the powder at the fire and sun; 400 fagots of willow for making charcoal thereof, and 100 of "talwode," and half a hundred of fagots, bought at divers prices by John Derby, clerk; and also boatage, portage, and carriage of lead, guns, barrels, and other necessities, to divers places, together with wages of workmen and labourers upon the making of the powder, bullets, and charcoal aforesaid, for twenty-two days; likewise by the same John paid at divers times between the 1st day of March in the 44th year, and the last day of March in the 48th year, 25*l.* 4*s.* 8*d.*

To Stephen Smyth for 200 "pycoys" price 12*d.* each; for thirteen iron "patell'" for guns, price 5*s.* each; for two great guns of iron, price 40*s.* each; for forty iron "martels" for guns, price each 10*d.*; for twenty-eight iron "drivells" for the guns aforesaid, price 3*d.*; for twenty-eight firing irons price 2*d.*; for ten pairs of iron forceps, price 10*s.*; and for 120 quarrel heads for springalds, price 1*d.* each, bought for the king's voyage.....19*l.* 2*s.*

Of John Derby, of the remainder of his last account, 184 lb. of powder for "gunnes," proceeding from 135 lb. of saltpetre, and 49 lb. of sulphur vivum; 242 lb. of pure sulphur vivum.

Sum of the delivery of divers things.

* * *

Quarells, 44,351.
 Iron guns, 29.
 Guns of "laton," 1 great gun with 3 "pootz."
 * * *

Barells, 1.
 * * *

Iron cressets to cast fire, 4.
 * * *

Iron martells, 6.
 Dryvells of iron, 28.
 Firing irons, 28.
 "Patellæ" of iron, 13.
 Iron forceps, 10 pairs.
 Lead, 1 "carratt" and 6 "wagh."
 Saltpetre, 1 pipe and 2 barrels, weighing 1050 lb.
 Gunpowder, 60 lb.
 "Moldes called formes to make bullets," 5.
 Sulphur vivum, 126 lb.

Let us examine the chief points worthy of notice in these accounts. There is a payment for helving or, as we should say, handling eight guns together with some hatchets. This word "helvyng" exactly corresponds with the French "emmancher" noticed in the accounts of the receiver of Caen.¹ It signified the manufacture and attachment of the stocks for the small guns. That they were very small there can be no doubt, for two great guns of iron

¹ See page 32, *ante*. It is still a household word in the midland counties.

cost only 40s. The guns were made of iron or brass, and one great gun had three pots or chambers. This one seems to have been a breech-loader, but the others were not so.

The powder was made in the manner which we have already described, but we gain the additional information that it was dried over a fire or in the sun, in wooden trays, or brazen or earthen pots or dishes. It was then deposited in large leathern bags, and transferred to small leathern bags for distribution when required. The charcoal was entirely of willow; indeed the properties of this wood which made it so valuable for this purpose had been found out a century before. Sir F. Palgrave writes as follows :—

“Another of the works of Ferrarius, an unedited epistle addressed to one Anselm, preserved or buried in the Bodleian, is of very great importance in the history of science. * * * The MS. appears to be of the age of Edward I. It contains several receipts for making ‘Greek fire’ and ‘Flying fire;’ the second of which contains the mode of compounding the nitrate powder, composed of one part of sulphur, two of charcoal of the wood of the willow or lime tree, and six of saltpetre to be very finely ground upon marble or porphyry, &c. &c.”¹

The manufacture of the bullets, and their storage, was identical with that already described, and the stores or side-arms in no way differed from those accounted for by John Derby.

About this time was written a curious treatise, “*Practica*” by one John Arderne, an eminent surgeon of the time of Edward III. In it we find the following receipt :—

“Pour faire un fewe volant :—

“Perez j. li. de soufre vif, ij. li. de charbones de saux, vi. li. de salpetre, si les fetez bien et sotelment moudre sur un pierre de marbre, puis bultez le poudre parmy un sotille coverchief. Cest poudre vault à gettere pelottes de fer, ou de plom, ou d’areyne, ove un instrument qe l’em appelle Gonne.”²

This projection of iron and brass balls by means of the gun was either a mere theory, or at most an experiment of the laboratory, unless Arderne had learned from the Italians to make use of these projectiles. Certainly neither the one metal nor the other had yet been used for shot in England, or in France: though in Italy in the first half of the century they were so employed. Indeed it is only at this time, corresponding almost exactly with the deductions drawn from French documents, that stone shot began to make their appearance in the English garrisons. Hitherto lead and arrows have been the only projectiles employed. But in 1378, as we learn from a document produced by Rymer, the king (Richard II.) gave directions to Thomas Norwich to purchase for the armament of the castle of Brest two large and two smaller engines called “*canons*,” six hundred *stones* for these and other engines; 300 lb. saltpetre, 100 lb. sulphur, and a cask of willow charcoal. The original document is as follows :—

¹ The Merchant and the Friar, by Sir Francis Palgrave, 2nd Edition. London, 1844. Preface, p. 11.

² Brit. Mus. Sloane MSS. 335 and 795: printed by Mr Hewitt, Ancient Armour &c. Vol. II. p. 293, and noticed by Mr Albert Way, in *Promptorium Parvulorum*, sub voce “Gonne.”

"Rex universis et singulis vicecomitibus, &c.

"Sciatis quòd assignavimus dilectum nobis Thomam Norwich ad emendum et providendum, ad opus nostrum, per supervisum, dilecti nobis Thomæ Restwold, in civitate nostrâ Londoniæ et alibi, &c., pro denariis nostris, promptè in manu per manus dicti Thomæ solvendis, Duo magna et duo minora ingenia, vocata *Canons*, sexcentas Petras pro eisdem ingeniis et pro aliis ingeniis; Duodecim Balistas.....ccc. libras de saltpetre, c. libras sulphuris vivi, unum dolium Carbonum de Salugh, &c.

"Et dolia et barellos pro præmissis imponendis, pro stauro et munitione Castri nostri de Brest, &c.

T. B. apud Westmon".¹

In Mr Devon's valuable collection of extracts from the Issue Rolls of the Exchequer, under date 10th December 1379, occurs the following interesting item.²

"To John Walssh, receiver of the king's provisions at Cherburgh. In money paid to him by John d'Arundell, marshal of England, late keeper of the castle and town of Cherburgh, at the time he was discharged from the custody aforesaid, for the undermentioned things remaining there for the king's use for the defence and provision of the castle and town aforesaid, viz: for ten guns to throw stones, two of which are of iron, and eight of other metal, seven of the said guns casting large stones twenty-four inches in circumference, and the three remaining casting large stones fifteen inches in circumference; 200 lb. of powder, 26 lb. of saltpetre, and 24 lb. of pure sulphur, were paid for at the exchequer in the account of the 17th day of June, in the eighth year &c."

Here we have iron guns, and others, doubtless brass, projecting stones of eight inches and five inches in diameter, not so large certainly as some of those mentioned by Froissart, but yet very formidable pieces.

At the same time that such large guns were in use for the armaments of fortresses, the small cannon were employed in considerable numbers in the attack. "An inquisition taken in 1375 at Huntercombe, (a place belonging to the Abbey of Dorchester), and now preserved among the records³ at the chapter-house Westminster, states that one Nicholas Huntercombe, with others, to the number of forty men, armed with 'haubergeons, plates, bachenettes cum aventayles, paletes, lanceis, scutis, arcubus, sagittis, balistis, et gongnes, venerunt ad manerium de Huntercombe,' and there made assault, &c."⁴

In 1378, when the English were besieging St Malo, Froissart tells us that

"Si firent les seigneurs de l'ost ouvrier et charpenter manteaux d'assaut; et avoient en l'ost bien quatre cents canons mis et assis tout autour de la ville qui contraïndoient durement ceux de dedans."⁵

To this the learned editor of Froissart's chronicles, M. Buchon, appends a note to the following effect:—

"Some modern historians consider that this number of 400 cannon is either exaggerated or erroneous. Others, among whom is Father Daniel, think that the

¹ *Fædera*. Vol. VII. p. 187.

² *Issues of the Exchequer*, by Frederick Devon. London, 1837, p. 212.

³ *Coram Rege*, Hil., 50 Edw. III.

⁴ Hewitt, *Ancient Armour*, &c. Vol. II. p. 298. This evidence was discovered by Mr Burt.

⁵ *Froissart*, Vol. II. ch. 29, p. 31.

cannon were very small. But possibly Froissart makes use of the word *cannon* in this instance, as a generic term for the various warlike engines employed in the attack of the town."

We are scarcely prepared to find so large a number of cannon carried by one army, and the author inclines to the opinion that the number is overstated, and also that the cannon were very small. Such guns, indeed, as these, and those named in the Huntercombe inventory can have been little if at all different from the hand guns, of later date. It may fairly be conjectured that these very small pieces were used as hand guns or fired from their carriages, as occasion might require. Many of those pieces which we have met with already, must, from their price and description, have been small enough to be so employed; and we know from MSS. of the following century that the hand gun was frequently only a miniature cannon encased in an oblong block of wood, which was allowed to rest on the shoulder of the person discharging it.

No further accounts of this half century possessing any great importance have been brought to light; but several entries in the Issue Rolls of the Exchequer prove that cannon were now in common use for the defence of castles. We hear of them at Carisbrook in 1379, from two different sources, and again at the same place in 1384; at Dover in 1372, and again in 1384; at Porchester in 1385, and at Rye in 1387: and we have already noticed them at Cherbourg and at Brest.

In 1379, the keepers of the castle of Carisbrook report the purchase of 100 lb. saltpetre at 15*d.* per lb., and 50 lb. sulphur at 6*d.* per lb. They also bought gunpowder and two brass cannon which cost £6. 6*s.* 8*d.*, early in the reign of Richard II.¹ The issue of the money for the above named saltpetre and sulphur occurs in the exchequer accounts.²

Another issue roll for 1384, is as follows:—

"To Sir Thomas de Beauchamp, knight, late Captain of Caresbrok Castle, in the Isle of Wight. In money paid to his own hands for so much money by him disbursed, viz.: to five canonnières, each having his cannon; and to one canonnière with three cannons, for the hire of the same canonnières and cannons, and for powder purchased for the same cannons late in the king's service in the retinue of the said Sir Thomas for the protection of the island aforesaid against the king's enemies, who in certain galleys at sea lately made an attempt to invade the island aforesaid. By writ of privy seal, &c., 26*l.* 5*s.*"³

This discloses the remarkable fact that cannon were, on some occasions, the property of private individuals, who hired their cannon and their own services at the same time, to the king for any special occasion. The fact seems clearly proved here; the words are "for the hire of the same canonnières and cannons." When the danger was over, they were dismissed, for the same cannons are said to have been "late in the king's service," which of course implies, no longer in such service.

¹ Mr Hunter in *Archæologia*. Vol. XXXII. p. 384.

² Issue Roll. Easter, 3 Rich. II.

³ *Ibid.* Michaelmas, 8 Rich. II.

In an indenture relating to the stores of Dover Castle in 1372, we find among the munitions of the fortress "*cc. garbas sagittarum, vi. gonnes.*"¹

The following bears date 1st May 1384 :—

"To Sir Simon de Burley, Knight, constable of Dover Castle, for the price of 12 guns, 2 iron patellæ, 120 stones for the guns, 100 lb. of powder, and 4 stocks of wood, purchased of William, the founder of London, and delivered to the said Simon by the hands of William Hanney, clerk, for fortifying and strengthening of Dover Castle, 97*l.* 10*s.*"²

These guns projecting stones, with their shot, powder, and stocks, were bought from a London founder. Did he make the guns, or buy them from abroad in the course of trade, and then resell them to the king? It seems strange that it should nowhere be mentioned who was the maker of any of these English guns, and certainly as yet we are unable to state that any of them were either forged or cast at home.

On the 15th May of the following year there is an entry of money paid "for carriage of cannon &c. from the Tower of London to Porchester Castle for its defence;"³ and two years later, 27th Nov. 1387, "wages of one canonier, lately residing in the fortification of the king's town of La Rye."⁴

In the year 1400, under date 3rd May, occurs an item

"To Henry Roberts, sergeant, dwelling near Guildhall, in the city of London £8. 8*s.* for 24 'quarell gunnes,' at 7*s.* each; to William Olliver, grocer of Boklersbury, for 300 lb. saltpetre price 4*d.* per lb., and 100½ lb. pure sulphur at 4½*d.* per lb. &c. &c."⁵

Thus the small guns still threw arrows, or as elsewhere seen, lead; while stone shot and large guns were employed for fortresses. In England, as we see, the word "*gunne*" or "*gonne*" is more frequently employed than *canon*, though the latter does sometimes appear. Walsingham illustrates this curiously; he says "*et illic figere vel locare gunnas suas, quas Galli canones vocant;*" and indeed the *gonne* had in this half century become so common an engine of warfare as to furnish Chaucer with a simile, evidently intended to appeal to the common understanding. In the "*House of Fame*,"⁶ written during the period of which we are treating, he says,

"As swift as a pillet out of a gonne
When fire is in the powder ronne."

Italy presented to our notice the first unquestionable voucher for the employment of cannon, and in Italy their manufacture was more rapidly developed than elsewhere. Iron shot were mentioned at Florence in 1326,⁷ and brazen globes were named by Petrarch as early as 1344.⁸ Judging by the price paid for projectiles at Ravenna in 1358, brass or bronze appears to have been the material employed. This information we obtain from some extracts out of the registers of accounts of Ravenna during the war with

¹ Sloane MSS. 335 and 795, printed by Mr Hewitt. Ancient Armour, &c. Vol. II. p. 293.

² Issue Roll. Easter, 8 Rich. II.

⁵ Issue Roll. Easter, 1 Henry IV.

³ Ibid. Easter, 9 Rich. II.

⁶ Book iii. Ed. Chalmers.

⁴ Ibid. Michaelmas, 11 Rich. II. ⁷ Vide "Proceedings," R.A.I. Vol. IV. p. 289. ⁸ Ib. p. 296.

Forlì in 1358, which also prove that cannon were manufactured at S. Archangel for especial employment in this war. We can estimate from the same source the weight of the projectiles employed, and the price of the powder and other stores for the cannon.

The original document is as follows :¹

1358. Die ultim. Jun.

"pro 5 brachiis panni lini pro faciendo sachos pro retiendo pulverem bombardarum, sol. 19, den. 6.

pro 25 lib. salnitre pro pulvere bombardarum ad rat. 6s. et 3 den. pro libra...
.....lib. 7, sol. 16.

pro una libra et 10 unciis sulfuris pro pulvere bombard. ad rat. 3 sol. pro libra
.....sol. 5, den. 6.

pro uno mantegheto² causa accendendi ignem pro faciendo trahere bombardas
.....sol. 8.

pro una cirnileia³ ferri causa fortandi ignem pro faciendo trahere bombardas
.....sol. 6.

pro une martello, et uno pari tanagliarum ferri pro carigiando⁴ bombardas
.....lib. 2.

pro 9 palottis bombardarum pondere 33 libr. ad rat. 2 sol. pro libra.....
lib. 3, sol. 4."

* * * * *

Die 15 Sept.

"nuntio misso de Cesena Sanctum Archangelum cum lris directis vicario S. Archangeli pro parte Ser Baschi ut faceret fieri *de bombardis*.....sol. x.

* * * * *

vicario S. Archangeli super facto bombardarum, quæ fiebant ibi."

From these accounts we gather that nine shot together weighed 33 lb.⁵ the average weight of each shot being thus $2\frac{2}{3}$ lb. The price of 2s. per lb. is far beyond that of iron or lead, and corresponds with that of copper or bronze, of which we may reasonably suppose the shot were made. Saltpetre cost 6s. 3d. per lb. and sulphur 3s. per lb.⁶ This, would make the price of a pound of gunpowder about 4s. 4d., supposing the proportions to be three parts saltpetre to one part sulphur and one part charcoal, as already described elsewhere. The stores include linen sacks to hold the powder, and the invariable bellows and hammer. On this occasion a pair of tongs is added, and the charcoal-pan is absent; possibly the *cirnileia* may have something to do with this.

Matteo Griffone⁷ tells us that a Bolognese youth was struck and killed by means of a bombard of the enemy, at Casalecchio in 1360; and Azario,⁸ speaking of the attack on the same place, says that the Bolognese assaulted it with innumerable ladders, "*sclopos, uncinos ferreos, balistas &c. &c.*"

¹ Fantuzzi, Monumenti Ravennati, Venezia, 1803, Vol. V. p. 412.

² *Manticetto, mantaco, mantachetto*, a pair of bellows.

³ To this word no clue can be obtained; probably it is wrongly copied from the MS.

⁴ *Carigare, onerare, charger*, (Ducange). We have already seen the use of the hammer in loading.

⁵ 33 lb. was the total weight of nine shot. They were clearly not 33 lb. each, as erroneously stated in the *Etudes*, Vol. II. p. 62. At Vol. III. p. 92, however, the weight is correctly given.

⁶ In the following year the price of sulphur was reduced to 14½ den. per lb.

⁷ Muratori, *Rerum Italicarum Scriptores*, Tom. 18, col. 176.

⁸ *Ibid.* Tom. 15, col. 387.

This word "*sclopus*" appears to designate a smaller description of gun; and as such will be further noticed in another place.¹

While in France we find no trace of any but very small cannon until the year 1375, and in England not until 1378, the chronicles of Pisa inform us of a bombard employed in 1362 which weighed more than 2000 lb. The Pisans were besieging the castle of Pietra Buona, within which "v'era uno, che gettava la bombarda molto a fila, et era la bombarda più di due mille libbre, e fece molto danno, che uccise piu uomini."²

From this date onwards we meet with constant mention of the employment of, and effects produced by bombards. A few instances only will be given, selected from those contemporary chroniclers who are considered by Muratori as veracious, and also as having written from personal acquaintance with, or careful enquiry into the facts which they relate.

Filippo Villani says that he was present in 1363, when the Council of Florence were advised by some who distrusted their captain, Pandulph Malatesta, to put the palace into a state of defence, and "di mettere le balestre grosse, e le bombarde in punto."³

The chronicles of Pisa relate that in 1364, the Pisan army went to the gates of Pistoja, and there "gittonvi le bombarde e molte quadrella."⁴ This is confirmed by Neri Donato, who also tells us that in the same year the men of Pisa came to the gates of Pescia, and those within cast from bombards "molte *pietre*, e quadrella, e lance."⁵ We have here the first positive mention of stone shot in Italy.

The chronicles above named state that there were in 1370 on the walls of Pisa "di buoni balestrieri, e di molte bombarde," and the besiegers, when they perceived these bombards, ran away, and dispersed over the country in their fear.⁶

Galeazzo and Andrea Gataro assert that in October, 1372, Taddeo Giustignano, the purveyor of stores to the Venetians in their camp, "si messe in ordine con edifici e bombarde," and that in November of the same year, the podestà and captain of Chioggia and others used bombards against a fort belonging to Padua.⁷ Galeazzo Gataro goes on to relate that the captain of the Paduan army sent to Padua for

"bombarde infinite, le quali vennero di presente, e tutte quelle, dove erano di necessità, furono discaricate, et ora nel campo de' Veneziani gittate: per la qual cosa con gravi lor danni, e con moltitudine di morti e feriti in quantità, convenne loro ritirarsi in disparte; e fu li' ferito Messer Federico Todesco lor Marescalo di una bombarda, per modo che poco passato gli convenne morire."⁸

¹ For further information on the subject of this word the reader may consult Omodei. Dell' origine della polvera da Guerra, cap. 5, pp. 38-40.

² Cronica di Pisa, Muratori, Tom. 15, col. 1037. These chronicles, though anonymous, were evidently written about the end of the 14th century.

³ Muratori, Ber. Ital. Script. Tom. 14, col. 740.

⁴ Ibid. Tom. 15, col. 1042.

⁵ Ibid. Tom. 15, col. 182.

⁶ Ibid. Tom. 15, col. 1058.

⁷ Ibid. Tom. 17, col. 104 and 107. Galeazzo died in 1405, and his son Andrea continued and completed his chronicle.

⁸ Ibid. Tom. 17, col. 111.

The same authors mention the employment of bombards both in the attack upon Curan by the Venetians, and its defence in the same year.¹

It appears by the Neapolitan journals that Queen Joanna besieging Teano in 1373, made use of "trabucchi, bombarde, e cave da ogni banda."²

In the same year the Paduans and Venetians again employed bombards against each other "che dall' una parte e dall' altra era tanto rumore, che non s'intendava persona nissuna." Many were wounded and killed on both sides, among the latter being Count Richard of St Boniface; and again shortly afterwards the fire of the Venetian bombards compelled the Paduans to retire with great loss.³

We learn from the Milanese annals, and the statement is confirmed by Mussi in the chronicle of Piacentino, that in 1373, Galeazzo Visconti employed bombards, in conjunction with other engines, in the siege of Vercelli with very great success.⁴

Daniello Chinazzo, in his relation of the invasion of the Venetian territory by the Duke of Austria in 1376, mentions that

"Quelli di Feltre, e di Civald, intesa la partita de Veneziani da Quero, mandarono due bombarde, una sul monte di Corveta, l'altra su la strada appresso la Chiusa vecchia, chiamata la Moschetta,"

and that shortly afterwards Cavalli, the Venetian captain, retook the two "bastie di Quero per forza di bombarde," and having taken up a position before Feltre, "cominciò a bombardar la città."⁵ This is corroborated by Andrea Gataro, who further tells us that the Genoese assaulted Tenedo, when by both them and the Venetians many bombards were employed.⁶

In 1378 the war between Venice and Padua was renewed, and affords a curious instance of bombards taken to the top of a steeple or belfry and fired from that position. Chinazzo relates that the captain of Padua "mise campo a Mestre, e combattè la bastia, ed il borgo di S. Lorenzo con gran gente.....la circondò da tutti i lati, battendola con bombarde e mangani.".....And when he had obtained possession of the suburb he "messero alcune bombarde sul Campanil di S. Lorenzo, colle quali facevano dentro della Terra grandissimo danno."⁷

Galeazzo and Andrea Gataro confirm these statements of the great value of the bombards in this attack.⁸

We read in the chronicle of Rimini that, in this same year 1378, Galeotto, besieging Cesena, made use of "cinque trabucchi, e bombarde, e balestre infinite, che di e notte non finivano;"⁹ and the Venetians, according to

¹ Muratori, *Rer. Ital. Script.* Tom. 17, col. 121-122.

² *Ibid.* Tom. 21, col. 1036. This appears to disprove the assertion of Sismondi (*Hist. des répub. Ital. du moyen âge*. Paris, 1826, Vol. VII. chap. 52, p. 249), that when Urban VI. was besieged in the castle of Nocera, artillery had not as yet been introduced into the kingdom of Naples.

³ *Ibid.* Tom. 17, col. 185-186.

⁴ *Ibid.* Tom. 16, col. 752 and col 515.

⁵ *Ibid.* Tom. 15, col. 709 and 710.

⁶ *Ibid.* Tom. 17, col. 225, 226. See also further on, p. 32. 54.

⁷ *Ibid.* Tom. 15, col. 714.

⁸ *Ibid.* Tom. 17, col. 251.

⁹ *Ibid.* Tom. 15, col. 921.

Sanuto, bombarded the Austrian port of Zara,¹ and, according to Chinazzo, took Cataro by means of bombards in the same year.²

Innumerable other instances of the employment of bombards in the attack and defence might be cited, but it would be to little purpose; for enough has been said to shew that they were in common use throughout Italy at this period, each state from north to south constantly making war on its neighbours, and thus requiring a powerful armament of these comparatively new, but invaluable weapons. But it is impossible to pass over without notice the famous war of Chioggia between the Venetians and Genoese in 1379-80, in which the bombards played so important a part. The story of this war is told by many authors, but we rely most upon the chronicles of Daniello Chinazzo, and Andrea Gataro, and especially those of the latter author. He informs us that the Venetians, to close the port of Chioggia, placed in the middle of the canal a vessel (*cocca*) well supplied with bombards, and the Genoese planted many great bombards on the bank, and fired at the vessel, which the Venetians were constrained to abandon. They retired to S. Domenico, and commenced to arm three barques (*barconi*) with bombards. A battle was fought on the bridge near Chioggia, and bombards were employed both by the Venetians and the Genoese, whose captain, Pietro Doria, sent some of his galleys to aid in the fight. Finally the Genoese took Chioggia, and there placed "*molte barche armate con balestrieri assai e bombarde;*" and the Venetians, in abandoning their position at Malamocco, first withdrew their bombards.

But while affairs were proceeding so prosperously for the Genoese, the Venetian populace, in despair at the result of the late actions, raised a tumult, and called loudly on the government to liberate Vettore Pisani, who had been imprisoned on account of his losing the action of Pola. The government set him at liberty, and created him, at the people's demand, naval commander-in-chief; when at once fortune turned in favour of the Venetians; for Pisani, in no way resenting the severity with which he had been treated, but animated by a pure spirit of patriotism, so greatly encouraged all by his counsel and his actions, that the Genoese, hitherto conquerors, soon became the vanquished in the war.

The Paduans and Genoese now used every effort to protect themselves from attack: they constructed a work at Malamocco, and armed it with "*grosse bombarde, e con altre bombarde.*" They had galleys in the canal furnished with bombards, to attack which the Venetians sent a number of small boats, "*et ogni barchetta aveva una bombarda in proda,*" and they fired at the Genoese, doing them much harm. Pisani sent to Treviso for all sorts of weapons, including bombards, and on every occasion where there was any fighting, there we hear of the bombards making such a noise that it seemed "*che il mondo venisse in terra*" or "*volesse finire.*"

Early in January 1380, the Venetians retook Loredò, and Torre Nuova, by means of two great bombards; of which "*una tirava pietre di libbre 195, l'altra di libbre 140; et una era nominata la Trivisana, l'altra la Veneziana.*"³ Pisani established these guns in battery on the bank, and proceeded to

¹ Muratori, *Rer. Ital. Script.* Tom. 22, col. 681.

² *Ibid.* Tom. 15, col. 716.

³ According to Chinazzo, this was called "*Vittoria.*"

bombard Brondolo. On the 22nd January the great bombard was fired, and it struck the Campanile of Brondolo, knocking down a great piece of the wall, the stones of which struck and killed Pietro Doria the Genoese general, and his nephew, whose bodies, with many tears and great grief on the part of the Genoese, were taken to Chioggia, and embalmed (*salati*) for removal to Genoa.

On the 23rd, the same bombard knocked down a great piece of the wall of the same Campanile, and killed 22 men. The Venetians made it a custom to discharge these bombards and the mangonels in the evening, and they were fired in the morning at daybreak against the monastery; and the Venetians continued to fire these two great bombards till a large part of the monastery was in ruins, and a considerable number of the men who were in it were killed.¹

By such means did the Venetians recover their losses, and defeat the Genoese. Perhaps of all the notices of early cannon which have been presented to us, this is the most remarkable. On board boats, in action on shore, in attack and in defence, on every occasion of a fight, the bombards were scattering death among the combatants. And in Italy, as in all the other countries which we have noticed, great stone shot and great cannon were introduced together. Although the Italians had used both iron and brazen projectiles, these had probably never reached any great size, but the huge stone shot had indeed terrible effect.

An inventory taken at Bologna in the year 1381, and published in full in the Emperor Napoleon's *Etudes*,² contains the following items relating to our subject:—

In primis in cortile.

Ducentos nonaginta quinque lapides a bombardis.
Lapides marmoreos a bombardis trecentos triginta quatuor.

In secunda camera.

Quatuor canones a bombardis inter quorum unus est cupri sine cepo, et alii cum cupis ferratis.

Duos carrittos a bombardis cum duabus rotis pro qualibet.
Unam scannum a bombardis cum uno police.
Unum canonem cupri a bombardis ponderis librarum CCCLXI.

In prima camera ferramentorum.

Centum septuaginta cocones lignei a bombardis.

¹ The descriptions given by And. Gataro and Chinazzo agree in all material facts. A portion of the text of the latter is printed below. "Alli 22, nel Campo da Fosson fu scaricata la bombarda grossa, la qual diede nel Campanile di Brondolo e gettò giù in terra un gran pezzo di muro, le pietre del quale percossero, & ammazzarono il Doria generale de' Genovesi, & un suo nipoti, i quali con grandissimi pianti, e con dolor universale de' Genovesi furono portati in Chioza grande, e salati per portare a Genova. Et alli 23, l'istessa bombarda gettò giù un gran pezzo di muro in detto Campanile, che ammazzo altri 22 huomini. Et era solito de' Veneziani caricar le bombarde la sera, e così i mangani, e nell' Alba gli scaricavano contra il detto Monastero; e continuandosi a scaricar le due Bombarde grosse soprascritte, gran parte di esso Monastero si spianava, & assai huomini di quelli di dentro restavano morti."

² Vol. I. p. 358.

In camera a bombardis.

Quinquaginta quatuor balotas ferri a bombardis lib. CCCLXXIII.

Sedecim balotas ferri a bombardis ponderis lib. CCC.

Trecentos octuaginta quinque balotas parvas ferri a bombardis ponderis lib. CCXXXV.

Centum triginta tres balotas ferri a bombardis ponderis lib. LXVI.

Ducentas sexaginta duas balotas ferri a bombardis ponderis lib. LXXXII.

Sexaginta balotas ferri a bombardis ponderis lib. XLVI.

Unum barillem novum sal nitri ponderis lib. ducentas sexaginta sex.

Decem et octo balotas ferri a bombardis pond. lib. sex.

Unam botexellam pulveris a bombardis ponderis lib. centum sexaginta tres.

Unam botexellam pulveris a bombardis non bona ponderis lib. LXXVII.

Tres pallos ferri } ponderis lib. CLXXXI.

Duo scrocatoria }
Novem scrocatoria ferri a bombardis.

Quatuordecim tassatoria ferri ponderis lib. triginta novem.

Undecim teleria a bombardis veteres et inutiles.

Quatuordecim bombardas novas fulcitas corrigiis telerii et canonibus.

Quatuor bombardas veteres fulcitas congiis telerii et canonibus.

Unam bombardam cum uno canone cupri.

Novem bombardas a scaramosando.

Duas bombardas una cum manico ferri, alia sine.

Unam botexellam pulveris ponderis lib. CXLVIII.

Buttighinum parvum cum sulfano integro ponderis lib. decem et octo et demidio.

Unum taschitum pellis cum pulveris ponderis lib. 7, onc. 7.

Unum taschitum plenum sulfani pistati pond. lib. 4.

Tres telerios novos non fulcitos a bombardis.

Camera a capistris, et a taglis.

Quadraginta duos cocones magnos ligni a bombardis.

Centum quatuordecim cocones parvos a bombardis.

Camera a balistis.

Sex mantighellos veteres et destructos ad sofandum in bombardis.

Duos buffitos novos a bombardis in una cassa.

This inventory is worthy of analysis. Let us first consider the bombards themselves. We find 14 new bombards, furnished "corigiis, telerii, et canonibus," 4 old bombards furnished "corigiis,¹ telerii, et canonibus." Then there are one bombard with a copper cannon, nine bombards for skirmishing, evidently very small or hand-guns, and two bombards, one with an iron handle, and one without. The *corigia*² were the iron bands used to fasten down the bombard to its *telerium* or support. The *teleria* were clearly and unmis-takeably the beds or supports in which the bombards were placed, and not, as some antiquaries think, handles for the guns. In this inventory we find them separate from the bombards, eleven worn out and useless, and

¹ Napoleon in this place reads "congiis telerii," and translates it "affuts courbés." This is clearly an error.

² *Collistrigium*, a yoke for oxen from "*collum-stringo*." or *corigium*, a binder, from *colligo*.

three new not attached to bombards.¹ The *canones* were the chambers for the bombards, in some cases, if not in all, distinct and separate from the bombards, though attached before firing; it is not improbable that they could be used independently of the bombards, if necessary. They are found not only with the bombards, as above, but in separate items of the account we meet with four, one of copper without a *cepus*, three with iron *cippi*; and another of copper weighing 361 lb.

These *cepi* or *cippi*² were probably blocks of wood, stocks in which the *canones* were placed when used separately from the bombards. They are again mentioned in an inventory of a later date, as used with bombards, and we will notice them again in that place. The *cocones*, of which there were 326 of different sizes, were the wooden plugs used to close the breech ends of the *canones*, after the latter were loaded; and a new plug was required after each discharge.

The whole operation of loading, and the form of the bombard and cannon are described in plain language by Andrea Redusio. This author in the "Chronicon Tarvisinum," writing of that which had come to his own knowledge during his lifetime, and describing the attack of the Venetian army on Quero in 1376, speaks as follows:—"After the occurrence of these events, the army of the Venetians passed by Quero and manfully attacked both forts, by means of bombards, which had never before been seen or heard in Italy, but which the Venetians had caused to be constructed in a most wonderful manner. The bombard is an iron instrument, of great strength, with a wide tube (*trumba*) in front, in which is a round stone of the size of the tube; and it has a cannon (*cannonem*) joined to it at its rear end, twice as long as the tube, but narrower, in which a black powder, made of saltpetre, sulphur, and willow charcoal, is inserted through the opening (*foramen*) of the cannon towards its mouth (*buccam*). This opening is then closed with a wooden plug which is pressed in; and when the round stone has been inserted and adjusted against the mouth of the cannon, fire is applied through a smaller opening in the cannon, and the stone is projected with great impetus by the force of the lighted powder; nor can any walls, no matter how strong, withstand it, as was found out by experience in the following wars. And when these bombards thus belched forth stones, the people thought that God was thundering from above."³

¹ A later inventory (1897) will shew even more distinctly what these *teloria* were, see p. 57.

² *Cippus*. The rough stem of a tree, a horse block, &c.

³ "Quibus sic peractis exercitus Venetorum Querum pertransit, et ambas bastitas viriliter impugnat, vi tamen bombardarum, quæ ante in Italia nunquam visæ nec auditæ fuerant, quas Veneti mirabiliter fabricari fecerunt. Est enim bombardâ instrumentum ferreum fortissimum cum trumba anteriore lata, in qua lapis rotundus ad formam trumbæ imponitur habens cannonem a parte posteriori secum conjungentem longum his tanto quanto trumba, sed exiliorem, in quo imponitur pulvis niger artificiatum cum salmitrio et sulphure, et ex carbonibus salicis, per foramen cannonis prædicti versus buccam. Et obtuso foramine illo cum concono uno lignæ intra calcato, et lapide rotundo prædictæ buccæ imposito et assentato, ignis immittitur per foramen minus cannonis, et vi pulveris accensi magno cum impetu lapis emittitur. Nec obstant muri aliqui, quantumcumque grossi. Quod tandem experientia compertum est in guerris quæ sequuntur. Quibus quidem bombardis tunc lapides eructantibus homines putabant desuper Deum tonare."—Muratori, *Rer. Ital. Script.* Tom. 19, p. 754.

The stores specified as being for the service of the bombards included nine *scrocatoria* of iron, fourteen *tassatoria* of iron, and one *scannum cum uno police*. What the *scrocatoria*¹ were we are unable to assert. Technical terms such as this are little noticed by the glossarists, and unless we can trace the origin of the word which it is sought to interpret, or can gain from the context some clue to its meaning, we must remain in doubt. The *tassatoria* were scoops or ladles for inserting the powder into the chamber; but this will appear more plainly from the evidence of a later inventory, which will shortly be quoted. Bellows, as usual, occur in the list of stores, and the hot iron was doubtless employed to fire the charge. Two carriages, each with two wheels, are mentioned; and, when we come to a later period, we shall be able to judge from the miniatures of contemporary MSS. of what nature they were.

Iron shot, 928 in number, of which 385 were small, appear in the "bombard-chamber;" and 620 stone shot, of which 334 were of marble, in the courtyard. Of good powder in casks, sacks, or bags, there were 318 lb. 7 oz.; and of bad powder 77 lb. 266 lb. of new saltpetre, 18½ lb. of whole sulphur, and 4 lb. of powdered sulphur were ready for the manufacture of more powder, when required.² Some of the shot are indicated as being so small that the bombards from which they were fired can have been no larger than hand guns.

Of such a nature as this, and very different from the great bombards with *canones* joined to them to hold the powder, must have been those which Andrea Gataro mentions as placed in three rows, 48 bombards in each row, that is to say, 144 bombards in all, on one carriage.

He tells us how Antonio della Scala (Scaligero), being anxious to defeat the people of Carrara,

"prima fece comandare tutte le genti del suo paese, che potevano portare armi, che subito fossero a Verona; depoi ordinò tre carrette armate a tre solari, e per cadaun quadro di solaro pose dodici bombardelle, che portavano palle di grossezza d'un uovo, che erano in numero 144 per cadauna carretta, con tre persone ancora per cadauna che avessero da tirare le dette bombardelle; et erano ordinate in modo, che di dodici in dodici si dava loro fuoco, e dovevano trarre tre fiato alla volta, una per cadauna carretta, che erano 36. al tratto, e ciò doveva essere allora, che si toglieva la battaglia contro le schiere Carraresi per rompere loro l'ordine.

Erano le carrette menate da 4. cavalli grossi, coperti d'arme per cadauna, con un' huomo armato con un' azza in mano per cadauno cavallo."³

Here we have on one carriage 144 bombards, each throwing a ball as large as an egg, managed by three men only, that is, forty-eight bombards by one man. Their small size is marked by the word *bombardelle* which is employed instead of *bombarda*. They were so arranged as to give their fire by twelve at a time, and the three rows could be fired at once, so as to

¹ Query? *Crocata*, a book.

² There are other very interesting items in this inventory: rockets winged with pasteboard, arrows called *muschita*, &c.; but as they do not belong to the subject of cannon, they are not discussed here.

³ Muratori, *Rer. Ital. Script.* Vol. XVII. col. 558; and see Giovanni Citadella, *Istoria della dominazione Carrarese in Padova*, Vol. II. p. 60.

discharge 36 balls together. Each carriage was drawn by four horses, with an armed man on each horse. This corresponds with the *orgues* which are found figured in books of a later date.

Another inventory taken at Bologna in the year 1397,¹ must close the list of notices of Italian cannon during this half century. The items which relate to the service of cannon are as follows :

In stantia curtis in domo inferiori et terrena.

In primis XII bombardas a secchia, deficiunt duo corigie de ferro, et sex cavielas de ferro, et quinque bletas de ferro de quibus due sunt magagnatæ et fractæ.

Unam bombardam saldum.

Duas bombardas cum Zippis saldæ.

XVII bombardas cum secchis, deficiunt XI bletæ de ferro et duas cavielas.

VIII bombardas, deficiunt sex cavielæ de ferro, et quinque blette de ferro, et unum cippum magnum de ligno.

Unam cippum a bombardam cum corigiis de ferro.

Unam bombardam pizolam cum manico fracto.

Septem bombardas cum teleris.

Unam bombardam pizolam cum lapide et cippo.

Quatuor scopos pizolos in uno telerio.

XXXIII scopos cum cippis.

Septem scopos sine teleris.

Unum scopum parvum a cavalito et sine cavalito.

Unum scopum cum telerio.

Unum scopum de ferro cum cippo.

VIII scopos de ferro de quibus sunt tres a manibus.

Unum telerium cum duobus canonis.

Unum telerium cum duobus scopis.

Unum canonem ad modum bombarde sine telerio.

Duas bombardas cum teleris a ballotis de lapidibus.

Tres salvavinellos ad implendum bombardas.

In camera ferramentorum.

Duodecim tassatorios de ferro a bombardis de quibus decem sunt ponderis lib. trecentarum septuaginta quinque de quibus unum fractum.

Decem et septem tassatorios de ligno.

Unum tassatorium de ferro parvum.

Septem tassatorios de ferro ponderis librarum viginti.

Septem tassatorios de ferro cum manico de ligno a scopis.

Quatuor bletas pizolas de ferro a bombardis.

Camera a balistis.

Sexaginta quinque libras de ferro a bombardis videlicet ballottas.

Septingentas quinquaginta ballottas de ferro a bombardis.

Unam cazolam de ferro causa carigandi bombardas.

Duo millia ducentos viginti ballottas de lapide a bombardam.

Unam bombardam poudoris librarum ducentarum septuaginta trium.

Unum palum de ferro sive tassatorium.

¹ Published entire in the Etudes. Vol. I. p. 363.

The details and names of the stores in this list vary somewhat from those in the inventory of 1381. There are here *bombardæ*, *canones*, and *sclopi*; the first being the larger, and the two latter the smaller pieces. Of the bombards, thirty-seven are described as a *secchia*,¹ or *cum secchis*, that is to say, with chambers like pails or pots; three others in good condition, two of which have *cippi*; nine with *teleria*, two of which are for stone shot; two small bombards, one having a broken handle, and the other having a *cippus*; and finally, in the crossbow chamber, one bombard weighing 273 lb.

Of the *sclopi* there were four small in one *telorium*; again two small in one *telorium*; thirty-five with *cippi*; one with and seven without *teleria*; eight others of iron, three of which were for the hand; and one small *sclopus a cavalito et sine cavalito*, i.e. to be mounted on a stand (*chevalet*), but without its stand. The *sclopi* were small guns, but wherein they differed from the bombards we have at present no means of judging.

There were but three *canones*, two of which were in one *telorium*, and one was like a bombard without a *telorium*. These cannon were evidently used independently of the bombards; and the word *secchia* seems to have taken the place of *canones* as chambers for bombards.

These items explain almost beyond the possibility of further doubt both the *cippum* and the *telorium*. In an item of eight large bombards there is missing one large *cippum* of wood; and the very next item is, one *cippum* for a bombard with binders (*corrigie*) of iron. Both *bombardæ* and *sclopi* are furnished with *cippi*, or with *teleria*, but in no single instance do they both occur together. They were evidently both wooden supports, stocks, or beds, for the guns, but there was some technical difference between them, which we are unable to discover. One item here, viz.: *four small sclopi in one telorium*, ought to set at rest for ever any doubt on the subject of the *telorium*; for how could four guns be *in uno telorio*, if the *telorium* were the handle or tail of a gun? What the handle was called we see in the "*bombarda cum manico fracto*."

The *corrigie*, or iron bands, passing over the bombard, and holding it down on its bed, again occur in this inventory; and we meet with iron *cavicleæ* and *bletæ*. The *cavicleæ* are no doubt pins or bolts to fasten down the *corrigie*, and correspond to the *chevilles*, so often already met with in French documents. The *bletæ* we have been unable to trace. They were probably some small iron nails, pins, or washers, but the word is not to be met with in any glossary.

The stores include "*salvavinelli*"² for filling the bombards. These were small measures or cups, and served the same purpose as the *cazola*³ of iron for loading the bombards; probably to take the powder from the barrels or bags, or to pour it into the gun when the *tassatoria* were not used.

¹ *Secchio*, a pail, pot, &c. The word *pot* is reproduced in various languages. At Rouen in 1338, we met with a "*pot de fer*;" in an English inventory (1372-4) occur guns with *pootz* or *pots*. Indeed, bearing this in mind, it is a matter for consideration whether we *must* refer the word *cannon* to *canna* a reed, when we have the English *can*, Fr. *canne*, Flem. *kann*, Germ. *kanne*, each signifying a pot or measure to hold liquor, and when we compare the remarkable similarity of form between a drinking mug, and the chamber with a handle of some of the early cannon.

² *Salvia*, a measure of wine. Ducange, *Salvare vinum*.

³ *Casola*, *cassola*, a measure. Ducange.

The *tassatorium*,¹ or as it is also called in the last item *palum*, was a scoop or ladle at the end of a long handle, used for loading with powder. It was of wood, or of iron with a wooden handle.

There were 750 iron round shot, 2220 stone shot, and 65 lb. iron for making shot.

Thus in Italy, as we have seen elsewhere, the small cannon and the large bombard with stone projectiles were employed side by side. Italy, always a step in advance of other nations in artillery, was in possession of the stone-projecting bombards some years earlier than the other countries which we have considered; and also enjoyed the advantage of iron shot in place of leaden ones. In all these Italian documents we have no mention of lead as a material for shot. Doubtless the superiority of the iron from its greater hardness was found out at an early date in Italy, and as it also combined the advantage of cheapness, it was invariably preferred for the smaller natures of guns.

We have now traced, as proposed, the history of cannon through the second half of the fourteenth century, in France, Belgium, England, and Italy. Let us state in a few words the conclusions to which we are led. Cannon of iron and bronze under the various names of *guns*, *bombards*, *cannon*, *sclopi*, or *schioffi*, are found bound down to large heavy wooden beds, and employed in sieges both for attack and defence throughout the whole period. Projectiles of lead, stone, and in Italy, iron, and even bronze, were thrown by them; also arrows, and Greek fire. But it appears, from the length of time which sieges lasted, that the art of opening a practicable breach by means of cannon had not yet been invented. Indeed, it is very doubtful whether with such powder sufficient force could have been obtained for that purpose. This powder was still a comparatively feeble agent. The ingredients pounded by hand in a mortar, were themselves but imperfectly purified, and when reduced to a state of fine powder, the gas must have passed very slowly through the mixture, and an immense quantity of the charge must have been blown out without being ignited. To prevent excessive windage, the leaden shot were driven forcibly home into the bore of the piece by means of a mallet and drift, (*drivel*, *cache*, *poussoir*,) and the soft nature of the metal allowed them completely to fill the bore. With iron and stone shot fired from the large guns, no drift was used, but the shot was inserted from the muzzle, and the powder by a scoop from the breech, which was then closed by a wooden tampion. The hot iron was still used to fire the charge through a vent, which was often covered to keep the powder dry. But rough as these appliances were, we must not despise too much the cannon of the fourteenth century. They were suited to the age. To knock down such a piece of wall as to kill twenty-two men at once, is a feat which is not easy even in these days; and it is interesting to consider how the very defects were suited to each other. With the appliances for forging and welding iron so imperfect as they were, what would have been

¹ *Palus*, Bas. Lat. *pella*, Fr. (Ducange). *Paele*, *pelle*, (Roquefort). Lat. *patella*. Ital. *Pala*. Any broad flat shovel or scoop, a baker's peel (Florio).

Tassa. schyphus, patera. Fr. *Tasse*, (Ducange). *Schyphus*, a scoop.

the use of granulated powder? No gun then made could have withstood the force of a large charge—and, bearing in mind the rapid increase of strain as compared to the increase of calibre, no large projectile could have been fired. Small projectiles, no matter what their velocity, would never have had the moral effect of those huge masses of stone from 200 lb. to 450 lb. in weight, crushing and annihilating everything except thick masonry. Again, had the art of constructing first rate guns been developed, what would have been gained where the powder was so weak as not to require them? We shall find, as we proceed in our enquiry, how the attack was made to keep pace with, or rather to overtake the systems of defence, which were altered to resist the force of the guns brought against them.

In the field, cannon had as yet made but small progress. Cumbersome, slowly loaded, and very costly both to manufacture and to transport; their effects were not to be compared with those produced by the longbow with its rapid delivery of a shower of arrows. Hand guns were invented, but were rude and clumsy in form; and scarcely to be distinguished from the small cannon, which in one instance, were mounted to the number of 144 on one carriage, and oftener two, three, or four on a small two-wheeled carriage, for service in the field.

Thus far we have had to trust to verbal description alone, but in the next paper we shall enter upon a period where we have not only the artists of the fifteenth century to portray for us varieties of form and material, but some of the very pieces of ordnance which were actually employed.



